

Your Vacation Home

**1962 Plymouth
Owners Report:**

POPULAR MECHANICS

FEB. 1962
35 CENTS

**Build It
NOW in
Your
Basement**



**Assemble It
This Summer**



- **Shopper's Guide: Portable Electric Drills**
- **Bizarre Weapons in Today's Little Hot Wars**
- **Clean-Line Furniture You Can Make From Metal**

TOOLS—BEST BUY FOR YOUR



**400 Strokes
Minute**



**BEST QUALITY
FINE FINISH SANDERS**

Straight-line lightweight sanders essential in furniture finishing, woodworking. Choose from models—handy 14 sq. in. economy model at \$13.95, in a pal kit with extra paper at \$16.95, or heavy-duty model in big 20-inch sanding surface, metal kit with extra paper, at \$19.95. All have strong molded plastic housings with exclusive patented super-power, magnetic motors driving 14,400 strokes per minute. Perfect for professional and amateur alike!



**2 Professional
Speeds**

$\frac{3}{8}$ " Jacobs Chuck

**DOUBLE-DUTY DRILL
MOST VERSATILE TOOL
IN YOUR WORKSHOP**

No other drill like it! $\frac{3}{8}$ " Jacobs geared chuck handles big jobs easily, yet drill is lightweight—easy to handle. Change speed in a jiffy. 3000 RPM for drilling thin metal and wood... 1000 RPM for thick metal and wood, plaster and masonry. Handles every job at the correct speed—polish, sand, grind, wire brush, mix paint, drive screws—you name it. \$29.95



**NEW...AND EXTRA SPECIAL!!
WEN ROTARY SHAVER**

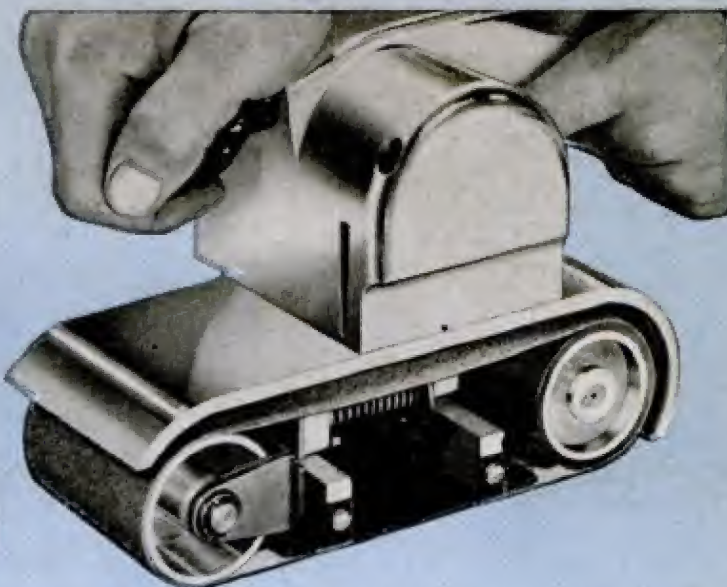
A really BIG shaving head to cover large areas and provide a super-fast shave in addition to traditional rotary comfort. Domed shape fits the contour under the chin. Hollow-ground self-sharpening cutters working close to the outer edge make upper lip shaving a cinch. It's the fastest, smoothest, lightest, quietest shaver on the market. \$19.95

ILLUSTRATED, PLAYBOY, ESQUIRE, POPULAR SCIENCE, POPULAR MECHANICS.

MONEY!

**W* EXTRA POWERFUL—
ALMOST DUSTLESS
NEW INDUSTRIALLY RATED
3" BELT SANDER AT
HOME WORKSHOP PRICE**

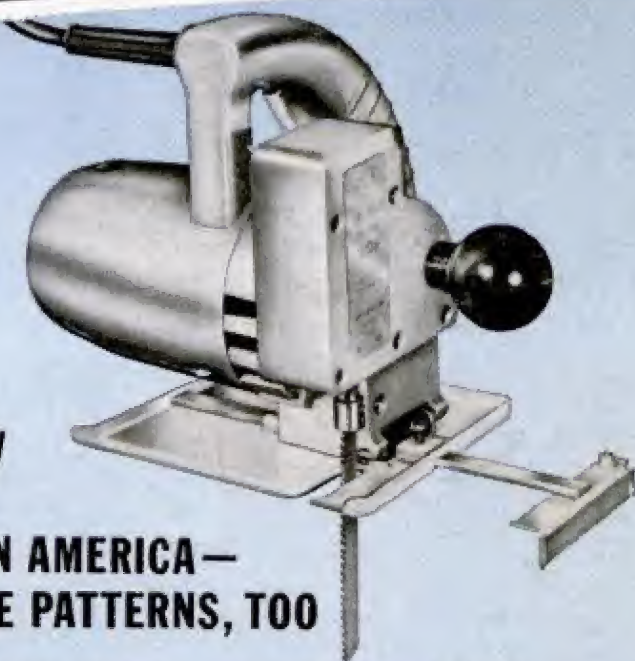
*Introduced only last Fall and already in world-wide demand. Firmly established as the finest product of its kind. If the buying rush has caused a shortage in your area, ask your dealer to order a sander for you. You'll be glad you waited.



Finally, the complete answer to home-workshop sanding . . . and finally at a sensible price. Exclusive casting design combines with forced air currents to cause dust to accumulate at rear—keeps work clean, easy to see. Cool-running 4¼ amp. motor turns belt at 850 surface ft. per min. Balanced weight—7 lbs.—and contour grip handle minimize fatigue. Includes 3 belts: coarse, medium, fine. \$44.95.

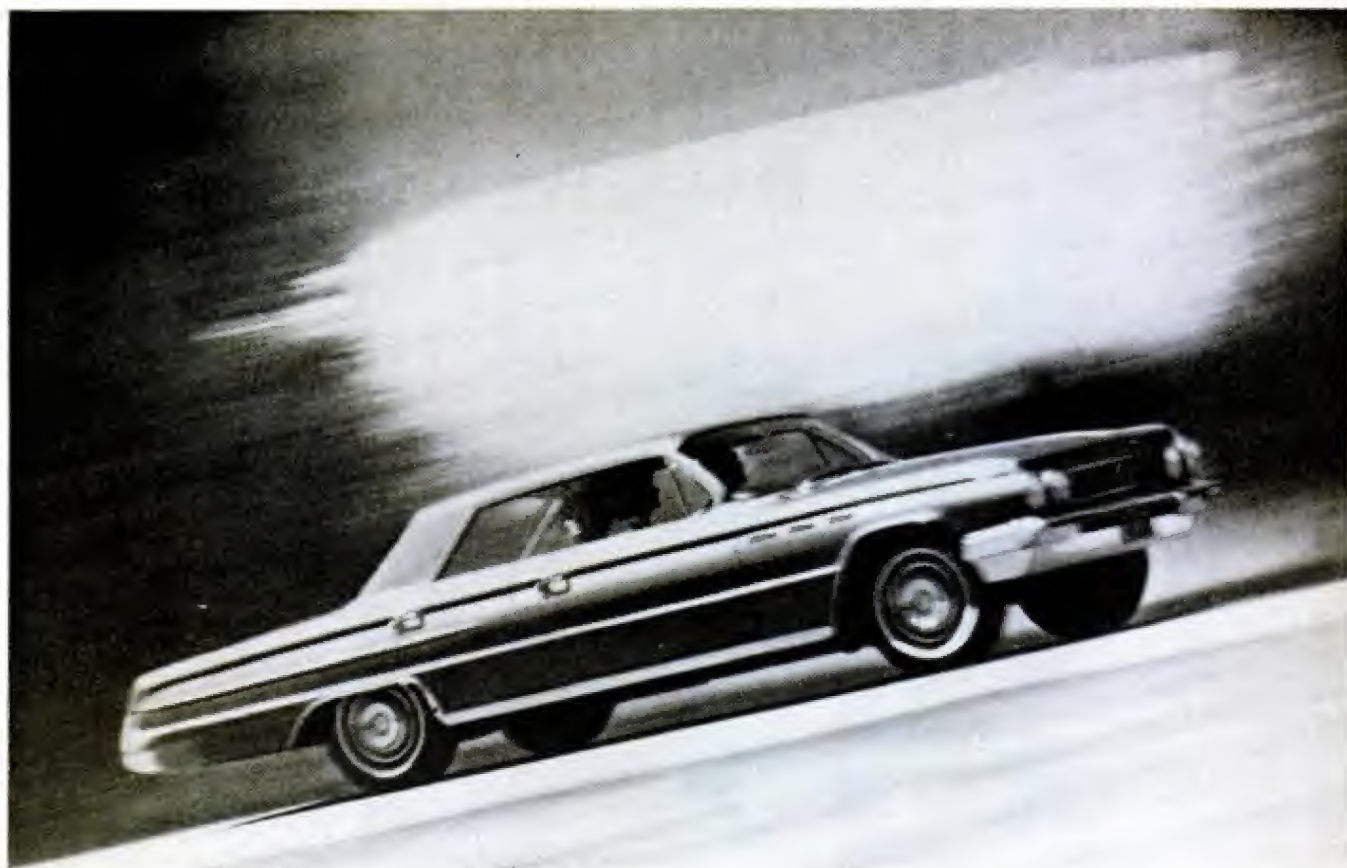
WEN

PRODUCTS INC. 5810 NORTHWEST HIGHWAY CHICAGO 31, ILL.



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BEST SELLING SAW IN AMERICA—
CUTS A 6" LOG—FINE PATTERNS, TOO**

Powerful ½ HP motor—Industrially Rated—yet comfortable to hold . . . easy to use. Does everything a pattern saw will do . . . more than a circular saw . . . many things a band saw or nibbler will do . . . and much that until now only a chain saw could do. Cuts a 6" log—yet cuts delicate patterns in any material normally cut with saw or knife. Complete with 7 blades, rip guide, circle cutter. \$44.95



THE BIG DIFFERENCE IN '62

ADVANCED THRUST

WHAT IT IS: A completely new concept in engine mounting and front-end suspension design. Advanced Thrust positions the mighty Wildcat V-8 and Turbine Drive forward over the front wheels. Placing more weight over these wheels enables them to resist being turned from their course by side winds. It takes advantage of the principle that the center of wind pressure against a moving car is toward the front end . . . and that more weight *ahead* of this center of wind pressure improves directional stability.

WHAT IT DOES: To begin with, Advanced Thrust makes your Buick track truer and straighter. But it also has other effects you'll appreciate. Snappier wheel

response and return. Less road shock up the steering column. Flatter cornering because the front-end frame has been made wider. And, with the engine moved forward, the front floor's gone nearly flat.

WHY YOU'LL LOVE IT: Advanced Thrust makes your driving safer, smoother, more relaxed. Your Buick stays right on course—even in gustiest crosswinds. Going is surer on ice, snow, wet roads. And with the new flatter floor, middle passengers have more room for legs, knees and feet. Feel the *big* difference in the '62 cars—drive the Advanced Thrust '62 Buick. Now at your Buick dealer's. Buick Motor Division — General Motors.

'62 BUICK

POPULAR MECHANICS



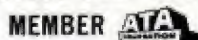
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come off for retreading . . .

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OUTSTANDING ALL-POSITION TRUCK TIRE PERFORMANCE . . .
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This One



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FEBRUARY 1962

POPULAR MECHANICS®

FEBRUARY 1962
VOL. 117 NO. 2

INTERNATIONAL EDITIONS • SPANISH: Mexico-Caribbean, Southern Hemisphere • **FRENCH •**

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Next Month . . .

Owners of new Ramblers and Chevy IIs tell you what they think of their new purchases. . . . Tape recorder buyers learn practical store-testing techniques. . . . How-to fans have a field day with such fine projects as: a water jet boat that goes anywhere; a guest room in a table; a banjo; a coil-winding machine and a portable workshop power tower.

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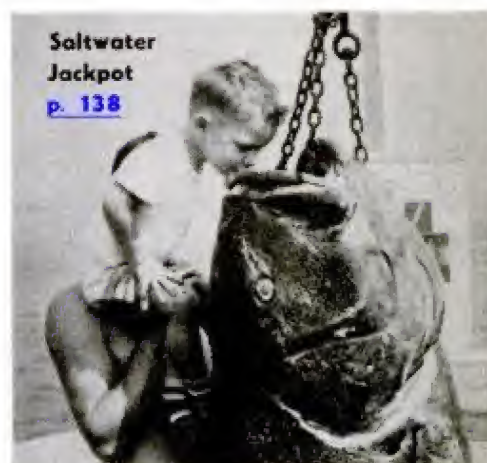
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100 FORD ECONOLINE VANS join RCA's fleet. For factory service of RCA products, technicians are on call from 157 branches.

RCA tries 1...adds 100 Ford Econolines !

Solid testimony that Ford's full-time economy only starts with low price !

"Starting last February, we've shifted our initial Econoline from branch to branch," says Jack H. Thompson, Fleet Maintenance Manager of RCA Service

Company, "and it's a truck that everybody likes. In the 8 months since, we've been averaging better than 20 miles per gallon and have had no repair costs."

Not all buyers come back for 100 more, but all will tell you how you save with Ford's new Van. You save with a price well below any popular conventional panel. Save on gas. Save on oil—go 4,000 miles between

changes. Save on maintenance, save on tires—even on licensing!

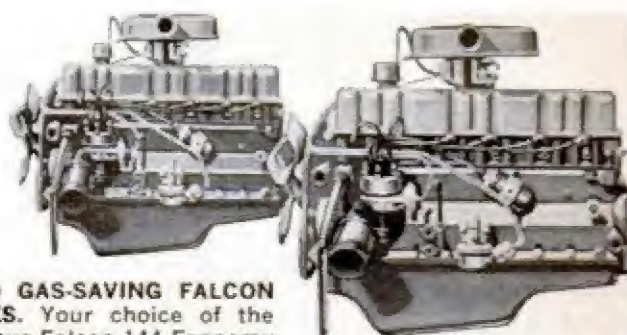
All told, savings on operating costs every 16,000-mile year can top \$100! The facts, from independent tests, are in Ford's Certified Economy Reports. See how you can save . . . full time!

FORD TRUCKS COST LESS

SAVE NOW...SAVE FROM NOW ON!



FORD'S ECONOLINE VAN HAS A FLAT FLOOR, front to rear, because the engine's up front where it belongs. Big 204-cu. ft. loadspace, up to 80 cu. ft. more than panels; $\frac{3}{4}$ -ton payloads! 4-ft. doors rear and curbside.



TWO GAS-SAVING FALCON SIXES. Your choice of the famous Falcon 144 Economy Six . . . or an optional new 170 High Performance Six!



TIRE-SAVING SUSPENSION. Unlike some other types, Econoline's truck suspension keeps front tires tracking true, makes them last longer!

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STENOTYPE

- ☐ Machine Shorthand

Name Age

Address County

City & Zone State

"I SAW MYSELF 10 YEARS FROM NOW!"



IT WAS PAYDAY. THERE WAS FRED, LOOKING A LITTLE RUN-DOWN. ON THE SAME JOB 10 YEARS. NICE GUY. MARRIED. TWO CHILDREN.

FRED AND I WALKED AWAY FROM THE PAY WINDOW TOGETHER. HE SEEMED DEPRESSED, UNHAPPY.

EACH WEEK I FEEL I'M LETTING THE KIDS DOWN. CAN'T SEEM TO AFFORD THINGS THEY NEED. I'M JUST NOT GETTING AHEAD.



FRED'S WORDS HIT ME ALL OF A SUDDEN. I COULD SEE MYSELF SAYING THE SAME THING—**10 YEARS FROM NOW!**



THAT NIGHT, STILL THINKING ABOUT FRED, I SAW AN I.C.S. AD ABOUT HOW I.C.S. TRAINING OPENS JOB OPPORTUNITIES. HOW PEOPLE LIKE ME CAN WIN PROMOTIONS, MORE PAY.



I MAILED THE I.C.S. COUPON THAT NIGHT. MY BOSS SOON LEARNED I WAS AN I.C.S. STUDENT. HE MOVED ME OFF THE LINE. AND TWO RAISES LATER...

GEE, FRED, THESE I.C.S. COURSES ARE GREAT! YOU OUGHT TO SIGN UP, TOO!

WELL...MAYBE SOME DAY...

FRED'S STILL ON THE SAME OLD JOB. STILL HOPING FOR THE "BREAK" HE'LL NEVER GET WITHOUT TRAINING. ONE DAY THE BOSS CALLED ME IN...

YOU'RE BEING PROMOTED TO ASSISTANT SUPERVISOR. AND A GOOD RAISE GOES WITH THE JOB!

THANKS TO THOSE PRACTICAL I.C.S. COURSES!

FREE! I.C.S. CAREER KIT

SEND COUPON NOW...
GET ALL THREE BOOKLETS

- 1 "HOW TO SUCCEED," 32-PAGE BOOKLET OF CAREER TIPS
- 2 "CAREER CATALOG," OPPORTUNITIES IN YOUR JOB FIELD
- 3 SAMPLE LESSON (MATH) SHOWS I.C.S. METHOD



For Real Job Security—Get an I. C. S. Diploma!

I. C. S., Scranton 15, Penna.

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- ☐ Commercial Art
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- ☐ Mechanical Engineering
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- ☐ Stationary Steam Engines

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- ☐ General

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New! Tires that double drive-wheel mileage!

Yes! Double the mileage! *Twice* as much as you get from ordinary truck tires on drive wheels!

We call this new truck tire the Super Cross-Rib. And with it come many advances in tire design.

Example: "Dual compounding." This brings together a soft, resilient inner tread with a super-toughened outer tread for long mileage. Heat buildup is lower and tire body life is longer.

We redesigned the tread, too. Its depth is 60% greater than that of ordinary tires, with a center groove which has many more biting edges. That means better traction — sideways, as well as forward and backward.

Anytime you can get double the mileage of another tire, you're way ahead. Super Cross-Rib is the way. Goodyear, Akron 16, Ohio.

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

GOOD YEAR

Great NEW Idea from CTI

...to help you get and hold a fine job
(or start a business of your own) in
Air Conditioning and Refrigeration!

"Practice" Your Way
to Bigger Pay!



Here Is Your
"Training Shop"

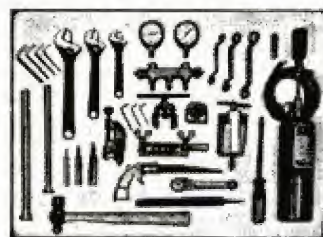


REAR
VIEW

EXCLUSIVE
CTI FEATURE!

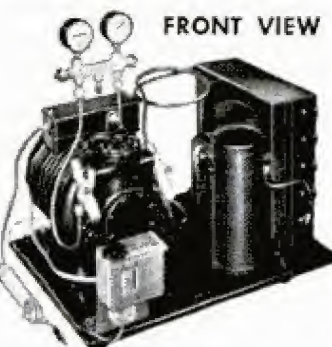
25 KITS—20 SHOP PROJECTS

Illustrated above is a view of the new CTI condensing unit, fully assembled. This is a commercial-type, heavy-duty, 1/4 h.p. unit. You build it from 25 kits of parts (and with tools) that CTI sends without extra cost. In addition, CTI includes 20 Shop Projects, which simulate the kind of problems you are likely to encounter in the field. After assembling your condenser, you may then build an air conditioner, freezer, refrigerator or milk cooler.



Tools Are Included

You receive wrenches, tube flaring tools, hammer, tubing, fittings, gauges and many other items used by the experienced mechanic. Everything is of professional quality. Best of all, CTI trains you to use tools with speed and skill.



FRONT VIEW

Go in Business



Because air conditioning and refrigeration is expanding so rapidly all over the nation, opportunities to go in business are plentiful. Many CTI graduates have accomplished this high aim. Start in a small way, from your own home, and gradually expand. In time you may wish to add a sales division. Manufacturers offer attractive franchises, including merchandising aids, to ambitious, qualified men.

You learn by practicing with operating equipment

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Over the editor's desk

Krick Critic

Read your article on weather about the predictions of Irving P. Krick (Oct. PM). I kept a tab on the weather locally, area and nation, and if the maps shown in the article are his predictions, he sure was all wet . . .

Greendale, Wis. JOHN R. OBERHOFER

Forecaster Krick has promised us a full report on the "batting average" of his long-range forecasts, in time for the next issue of POPULAR MECHANICS.

Radiation Instrument

Where can I get an instrument to measure fallout radiation? I don't want to stay in my bomb shelter any longer than necessary . . .

Annandale, Va. GEORGE A. BIRDSALL

There's a source for an approved commercial unit listed on page 77 of our last issue (January '62 PM).

Hood for Grandfather



I made this grandfather clock from a print which appeared in your April '56 PM—with this difference: It has a detachable hood (see photos) so it is easy to make any adjustments needed on the movements. This 7½-foot-high clock is made of solid Missouri walnut.

Leadwood, Mo.

IVAN E. FORSHEE

1700 Portholes

To get this 54-inch model, I enlarged your building plans for the 36-inch model liner U.S.S. United States. My model required 6½ years to build, has a laminated basswood hull and is completely hollow all the way up to the smokestacks.

The superstructure is fabricated brass and the 64-feet of railing are made of sol-



dered copper wire. I cast all anchors and screws by the lost wax process with fine results.

Lifeboats, cargo booms and radar tower are aluminum-foil covered. There are 1700 portholes in the hull. The model won the purple Sweepstakes ribbon this year at the Minnesota State Fair.

Duluth, Minn.

RALPH W. ANDRES

Soccer Versus Football

Obviously the author of your November article, *Football's Fabulous Foremen*, has never seen a game of pro soccer. He claims that football is probably the fastest paced, most varied and consistently thrilling of all sports. Soccer is faster paced and requires more skill and courage than football—a good soccer team could run circles around a football team.

Except for the backfield, football is strictly a game of brute strength. On a good soccer team, every man is of equal importance.

Westtown, Pa.

ERNEST FOSS III

Any football fans care to make a line plunge into this argument?

Jerky Pemmican

Got quite a kick out of your formula for pemmican (p. 24, Nov. PM). Maybe that is the government formula, but try to sell it to an Indian and he'd have your scalp.

The main ingredient in pemmican is jerky, the salted and dried flesh of almost any game animal. Plains Indians used buffalo; others used venison or antelope. White pioneers used beef or even horse meat.

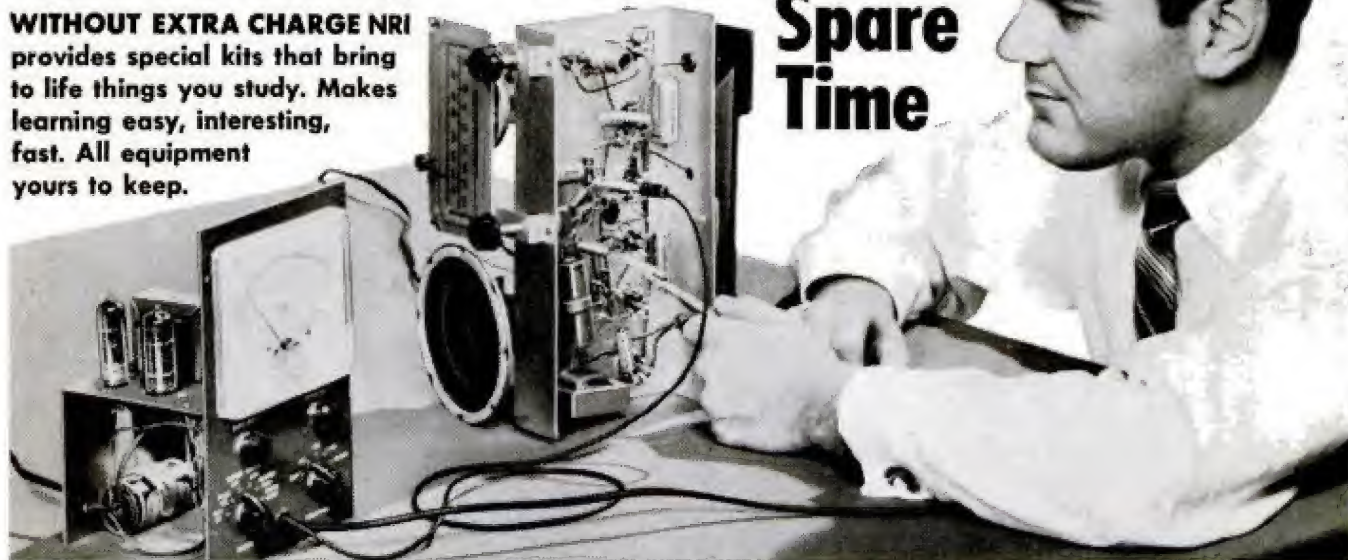
(Continued to page 14)

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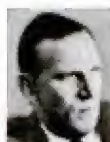
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J. M. SMITH
President

If you check the classified advertisements in your local newspaper, you will undoubtedly see more job opportunities available for men with Electronics training than for any other field. Hardly without exception, these are better than average jobs, with bright futures . . . jobs for which YOU could qualify through NRI training. Thousands of men like yourself—most of them without a high school diploma—have moved up to good pay and enjoy greater prestige in jobs with TV and Radio broadcasting stations, in industrial plants making Electronic equipment or in businesses of their own where they sell, install and service Radio and TV sets.

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NRI Trained These Men



I was working in a textile factory trying to make ends meet. Now I own one of the most modern service shops in this section. **ARGIE C. TAYLOR**, Glasgow, Ky.



After graduating I was a shipboard radio operator. Now I am chief engineer at Station WARA. **RAYMOND D. ARNOLD**, Attleboro, Mass.



Thanks to NRI I am in a top position with the Federal Aviation Agency in the Navada Electronic Section. **JOE DUCKWORTH**, Fort Worth, Texas.



Four months after starting your course I left my job in a hardware store to work at Raytheon Manufacturing. Now I am an engineering assistant in Microwave Power Tube Research and Development Laboratory. **LEONARD BLOOM**, Newton Centre, Mass.

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Pemmican is made by pounding the meat to a pulp and adding such roots, herbs and berries as are at hand.

Jerky itself is a good survival food, but one would want more than 10½ ounces of water a day to go with it as it is very salty. I lived four days on a piece of jerky no larger than your fist and came out none the worse for the experience.

Golden, Col.

ORVILLE BALL

PM Outdoor Editor Dick Kirkpatrick also disagrees with the government version of pemmican. The first he ever ate was made of venison, bear grease and wild blueberries, looked like a gray-blue candy bar and tasted pretty good. Some Minnesota squaws made it to sell to fishermen and and tourists (the men and their families preferred Spam and beans).

Hold It, Tom

I implore Tom Killmon not to rebuild the early man-powered helicopter he has (p. 8, Oct. '61 PM). Many readers may remember that the Langley aerodrome was rebuilt and flown, but the new parts used invalidated its claim to priority over the Wright brothers. Any new parts added to the Ingoldsby helicopter would give rise to the suspicion it would not fly in its original form.

Mr. Killmon could build a replica, as

nearly as possible of the same materials, using the original gears as patterns in casting new ones. Then, if the replica flies, it proves the practicality of the original.

Pelham, N. Y.

LAURANCE F. STUNTZ

Rewarding Results

The handsome new plaque hanging on our office wall is the National Safety Council's Public Interest Award for 1961. We're proud to have earned it. And we're equally proud of other 1961 awards which have been made, individually, to two of the *Popular Mechanics* editors.

One was the Annual Citation for Aviation Writing given to PM's Aviation Editor, Kevin Brown, by the Illinois Wing of the Air Force Association. The other was a Writer's Award for Outstanding Journalistic Service made to PM's Outdoor Editor, Richard B. Kirkpatrick, by the American Power Boat Association.

We knew that Dick's special articles in the March boating issue and Kevin's special aviation section in June were worthy of such recognition. Your letters in response to them had already confirmed their value.

For telling our boys how much you appreciated their material, then, here's a hearty thanks from all of

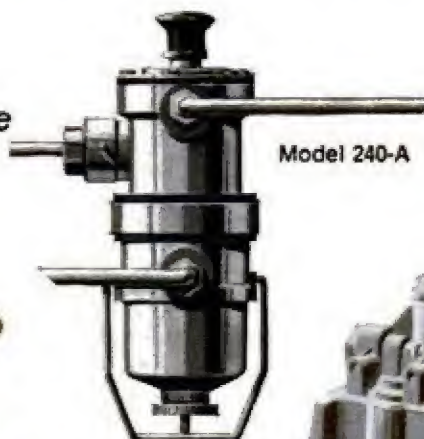
The Editors

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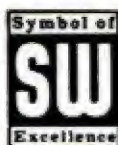
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THE ENTIRE FIRST GRADE of the Bartlett, Illinois school (28 kids) lines up in front of the Travelall wagon.



Below, all 28 youngsters fit into the wagon. Those on the tailgate could have ridden in front seat as it was empty when this photograph was taken

SPOTLIGHT on the TRAVELALL

By Jim Whipple

MANY OF US OLDSTERS (over 30) can remember the high, boxy station wagons of the 1930's and 40's, with their latticed, varnished wood panels and fabric roofs. They jolted and creaked along at 50 m.p.h. or so, and in a stiff cross wind the driver felt a strong kinship with the helmsman of an offshore schooner.

Squeaky, drafty old crates they were, but they could really haul the goods. I remember helping a friend move his belongings in a faithful old wagon that we called the "Plywood Playground." We heaved barrels of china and books onto the tailgate and slid them into the cavernous body.

After World War II stylists "discovered" the station wagon and rapidly transformed it from a high, wooden ark to a low, jelly-bean-shaped vehicle of steel and glass.



Over-all height plummeted from a stately six feet to near sedan levels of 56 inches.

Among these passenger-car adaptations International Harvester's Travelall is unique. It was designed to bridge the gap; to provide a roomy, comfortable station wagon no bigger than the smaller family cars (not compacts) yet be capable of hauling far heavier and larger loads than any passenger-car station wagon.

When you first walk up to a Travelall it looks huge. You will be surprised, as we were, to learn that its over-all length is only 202 inches bumper to bumper, and that it's a modest 75 inches wide. It is 70 inches tall, however, which makes it, until more than International's current rate of 5000-6000 per

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This height really pays off, you'll find, as it gives some features that you just can't get in a conventional U.S. passenger car—such as 8.6-inch ground clearance; seat cushions that are 15 inches off the floor and a roof that's 38 inches above the seats. The middle seat folds forward to make an enclosed load space well over six feet long.

The cargo area is 42 inches high, from the deck to headliner, and 49 inches wide between the wheel wells. An optional third seat can be attached to the body floor and will hold three adults with 34 inches of headroom.

The tailgate is counterbalanced and has a rear window powered by an electric motor that slides down neatly into it.

Total interior load space behind the front seat is 124 cubic feet, 50 percent more than in a Buick Special or Olds F-85 wagon, for example.

Load carrying capacity is 1550 lb. including passengers. And that's figuring it conservatively.

Travelall's ride is on the firm side, like many imported cars, but its torsion bar independent suspension makes it stable and keeps it from swaying in spite of its height. Travelall just doesn't bounce. Small bumps such as expansion joints jiggle its solid structure but soft seat cushions absorb this nicely. Cushions, incidentally, are foam rubber covered by durable nylon fabric which is breathable and a great hot weather boon compared to sticky plastic in the typical wagon.

Vision is great on all sides. The driver sits high and surveys the traffic beneath him with a clear view of all corners of the wagon. For this reason, among others, my wife took to the Travelall immediately, finding it easier to guide into a parking slot than our own lighter car.

Manual Shifting a Workout

Travelall's steering is slow but precise and easy as long as the car is rolling. For those who plan to do much driving in congested traffic, power steering is available. Manual transmission and clutch are built for long life and heavy loads and operating them can get tiresome in traffic. Three-speed and overdrive, or four-speed synchromesh transmissions are available. My wife preferred very strongly the automatic transmission with which one of PM's test Travelalls was equipped. This one also had the 155-horsepower V8 engine which made a smooth, relatively quiet combination that my wife found very pleasant to drive around our small country town.

FEBRUARY 1962



WIDE REAR OPENING makes Travelall a real hauler. Its cargo space swallows nearly all of 4 x 8-foot plywood sheets and takes furniture up to 35 inches high

She found it hard to believe that this pleasant, practical vehicle, was neither more nor less than a skillfully modified truck chassis. Reasonable cruising speed for this model was about 70 miles per hour.

PM also tested a manual transmission model with six-cylinder engine of 220 cubic inches rated at 112 horsepower. Teamed with three-speed manual transmission and a 3.73 to 1 axle ratio this engine moved the heavy Travelall briskly up to 60 m.p.h. in 16 seconds from a standing start.

Comfortable cruising speed for this unit was 60 to 65. Above this speed the engine became noisy.

This wagon was equipped with Power-Lok limited-slip differential which gave it positive traction on both rear wheels. Thus equipped, the Travelall handled boat-launching chores on the muddy banks of a lake with eye-opening assurance.

Jungle Buggy?

If you plan to explore South American jungles or work the Texas oil fields with your Travelall, four-wheel-drive is available. However, this equipment will cancel out the easy riding and steering.

In a combined usage pattern of small town stop-and-go driving and high-speed cross-country runs the stick shift Travelall scored 17.5 miles per gallon over-all, a commendably low rate of consumption for a wagon in the 4000-lb. class.

At \$2797 factory retail for the wagon with manual transmission and Deluxe interior trim, Travelall isn't cheap. But its rugged character, tremendous capacity and docile road manners make it a natural for a large family or anyone with the kind of out-of-the-ordinary transportation needs for which this wagon is ideally suited. ★ ★ ★

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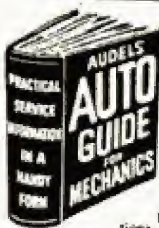
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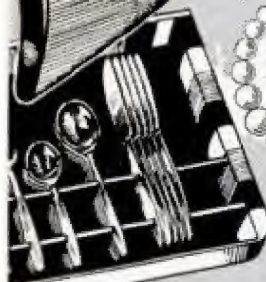


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Pentagon sidelights

By William R. Kreh

An unexpected package arrived in the mail recently for an ex-Navy man.

In it were some personal articles of his which had spent more than 19 years at the bottom of Cavite Bay in the Philippines. The seaman served in the submarine USS *Sealion* when she became the first submarine to be sunk in World War II. When the *Sealion* was raised for scrap recently, his belongings were found. Among the items returned was a message to him announcing his daughter's birth. His daughter is now 20 years old.



Here's an absolutely rainproof raincoat. In recent Army tests, a cotton coat treated with a new repellent stood continuous 24-hour laboratory rain, at the rate of an inch per hour, for more than a week. The new raincoats will become standard equipment for soldiers stationed in areas where rain is heavy, as in the tropics.



A torture chamber has been opened by the Army Signal Corps at Fort Monmouth, N. J., to test production samples of some 20 million dry batteries bought every year for all the armed forces.

The new unit's job will be to "torture" the batteries—exposing them to heat, humidity, cold, shock vibration and similar punishment. And some of the punishment is pretty severe. The Navy, for example, requires its batteries to operate efficiently even after being shot 40 feet by an air cannon.



Invisible dust may tell us more about the weather in a project being followed closely by the Office of Naval Research.

Scientists have strung 30 miles of wire in central Illinois in order to put a uniform charge on tiny particles of dust. Natural dust has a mixture of charges. The dust will rise up to about 7000 feet and be tracked by special airborne and ground instruments to reveal air movements better than smoke can. It's hoped the project will show why some clouds produce rain and some do not, what causes cloud droplets to grow into drops of rain, and what effect electrical forces have on rain.

Sea lions bark under water. The Navy just found it out in experiments on the West Coast. It means one more up-to-now-unidentified sound can be ignored by sailors listening on sonar for enemy submarines.

Breath can be measured by a machine installed by the Air Force at Wright-Patterson Air Force Base in Dayton, Ohio. So sensitive it can measure thrust as gentle as the force of human breathing, it will be used to measure precisely the thrust of ion rocket engines and other propulsion systems designed for space ships.

Bird watchers around Boston aren't having much to do with the Navy these days.

It seems the Massachusetts Audubon Society not long ago started spraying sea gulls with red dye to help trace their nesting habits. But then too many reports of red gulls started coming in. Investigation showed that the Navy Hydrographic Office was using the same red dye as the gull painters to study tides off Portsmouth, N. H. The birds swam in the dyed water and came out red.

A coat of special wax is given transport planes of the Military Air Transportation Service after every 1000 hours of flying time. Officials say the wax enables the plane to pick up five to ten knots in air speed by cutting friction, also saving fuel.

Cloud seeding in the Arctic may help the Army "weather" in the enemy if any future war is fought there. Recent polar tests have shown that seeding clouds with dry ice from an airplane can result in a good snowstorm. A test plane seeded an eight-mile path, using about five pounds of dry-ice pellets per mile. Twenty minutes after seeding, there was an intense snowfall. Visibility was cut from 12 miles to about an eighth of a mile within the snow area and the cloud ceiling dropped from 1200 feet to about 300 feet. The snow continued for 15 minutes.

Salt water and garbage can be converted to electricity by a new Navy bacterial battery. Bacteria are supplied with organic matter for food and sea water for oxygen. Their life processes create an electrical current that can be led off on wires. The experts say that many kinds of wastes, including sewage, would make suitable foodstuff or "fuel" for the microscopic generators.

The Navy's not saying what its bacteria will eat, but has confirmed that a laboratory model of a bug battery has been producing current for a year and will soon get a working test at sea.

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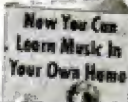
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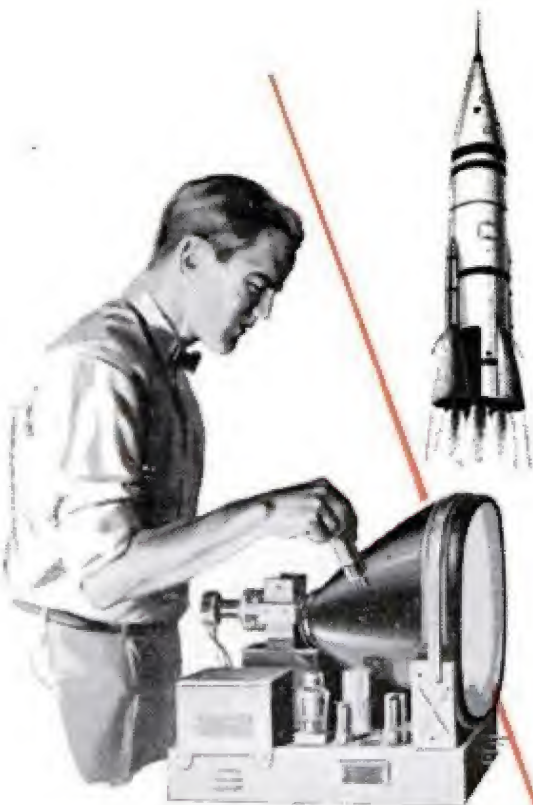
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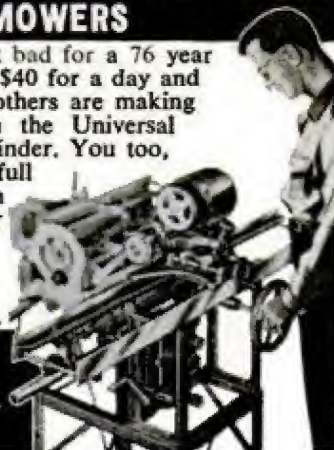
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The INVENTIONS WANTED sign is out again at the National Inventors Council, with a new list of inventions wanted by the armed forces and other government agencies. Here's a selection of interesting possibilities from the 83 suggestions listed:

- . . . A method of preventing snow and ice accumulations on airfield runways.
- . . . A self-driving anchor stake for guy wires on radio antennas and towers.
- . . . A relief valve that will vent gases from rocket fuels in zero gravity without letting the liquid fuel escape.
- . . . A wind force and direction sensor that won't foul in ice, snow and extreme cold.
- . . . A wind-measuring system that will report both horizontal and vertical air movement.
- . . . A wind force and direction meter that works reliably without moving parts.
- . . . A method for keeping birds off—and away from—the tracks used for high-speed rocket sleds, without interfering with the track or the sled. (This one would be worth real money in a lot of places besides the government, too.)

For the complete list of inventions wanted, plus an outline of NIC's operations, write for the Inventions Wanted bulletin to the National Inventors Council, U.S. Dept. of Commerce, Washington 25, D. C., or see any Department of Commerce field office.



Another valuable government service to inventors and businessmen is the Products List Circular published monthly by the Small Business Administration. It lists hundreds of new products and processes to help small businessmen find new fields or ways to improve their present methods. The privately-owned inventions are available through arrangement with the inventors; the government-owned patents can be licensed on a royalty-free but non-exclusive basis.

The current issue, available at any office of the SBA or by mail from the Small Business Administration, Washington 25, D. C., lists ideas ranging from a pinless diaper and a keepsake baby spoon to a pavement-breaking bulldozer attachment and a hay tedder. By the way, how many people do you know who know what a hay tedder is? We didn't. ★ ★ ★

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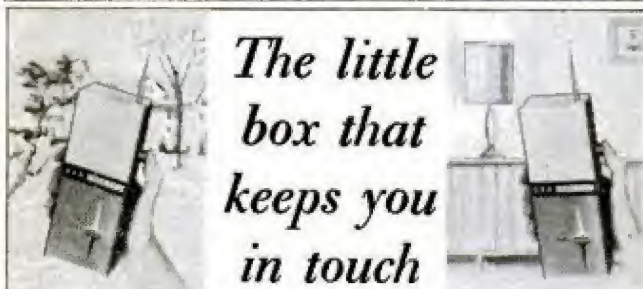
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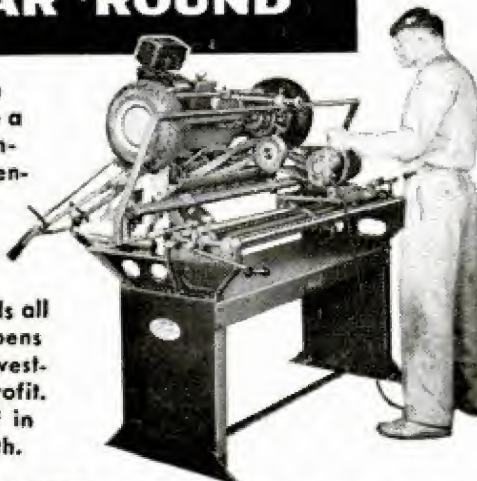
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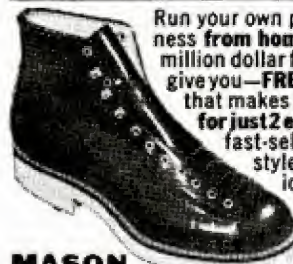
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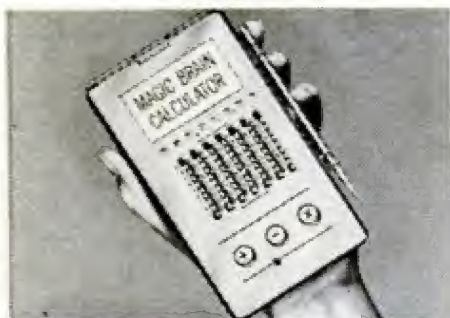
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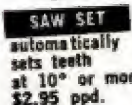
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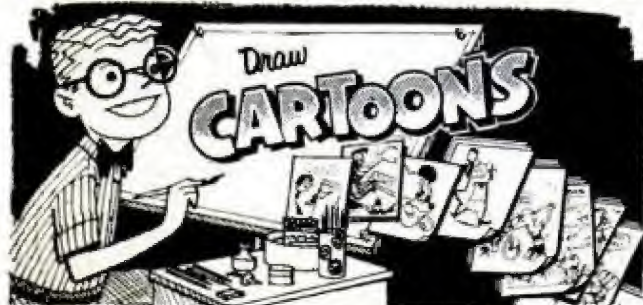


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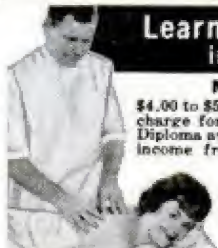
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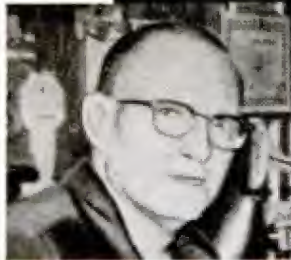
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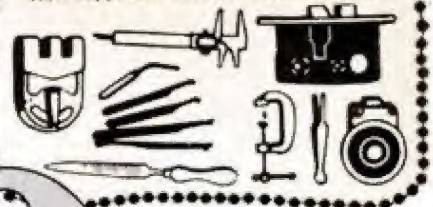


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Science bulletins

It's official: "Unintelligibility" is a characteristic of the female voice. This flaw, according to Air Force researchers, is due to a lack of harmonics or overtones of appropriate vibration rate, and may rule women out as broadcasters of routine transmissions for aircraft communication systems. However, the female voice could be useful in broadcasting warning transmissions, the researchers concluded, since it has a "natural priority in commanding a man's attention."

An Ohio farmer harvests cattle feed every day, says the American Iron and Steel Institute. Using hydroponics—a method of blending water, nutrient chemicals, proper light, temperature and humidity—he's growing supplemental feed in steel trays. The crop grows an inch daily.

Before this experiment he needed two acres of land to sustain five cows. He now feeds the five on one acre with the addition of his hydroponics-grown food.

Used-up uranium is flying high. Plane builders have found it is an excellent material for use as counterweights in wing tips and tailpieces of commercial jet planes; it has a higher density and costs less than sintered tungsten and is available in large quantities. Depleted uranium contains less than the natural concentration of U-235. The Atomic Energy Commission since the first of the year let depleted uranium be used for this purpose by countries other than Soviet-bloc nations.

Attention, young science and engineer graduates: The Guggenheim Foundation, 120 Broadway, N. Y. 5, N. Y., has 18 fellowships for graduate study in rockets, jet propulsion, space flight and flight structure available. Candidates must file by March 1, this year, and be citizens of either Canada or the U. S.

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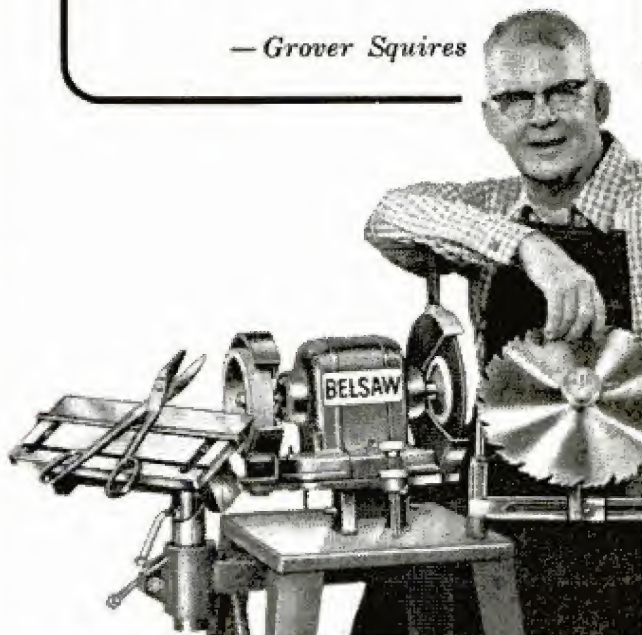
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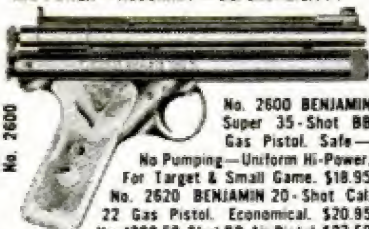
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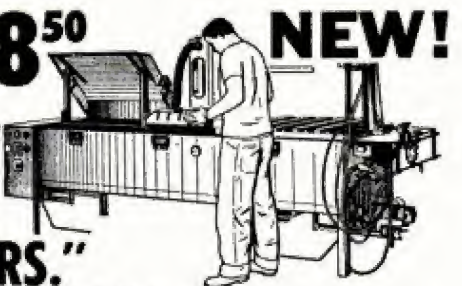
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Science overseas

By William Kreh

There's \$280,000 awaiting the inventor of a silent, road breaking pneumatic drill. A group of British manufacturers, joining the London Noise Abatement League campaign, will pay at least this much for the right to make the quiet drill.

Radioactive roadblocks? Space vehicles will have to pick their way through masses of radiation, just as terrestrial ships do through icefields, speculates Russian Air Force General G. I. Pokrovsky.

The U.S.S.R., he adds, has already compiled a map of radiation zones in outer space so that this can be done.

Radiation news, by the way, is not all bad. Male radiographers in Japan have more boys than girls, and the evidence is that radiation-caused mutations in sex chromosomes leads to this occurrence. That's the theory of Katsumi Tanaka, professor of human genetics at Tokyo Medical and Dental University, backed up by research into radiation effects on fruit flies.

A survey of 5733 X-ray technicians revealed that 53.86 percent of their offspring born after they took up X-ray work were male, compared to 51.32 percent for the rest of the population.

Paper tires? Perhaps. The Chemical Institute of Canada says the crude rubber content of tires can be reduced 10 to 40 percent by substituting lignin, a waste product of paper manufacture. Lignin has been used in carcass and tread of experimental nylon-cord tires.

Frozen rats, stiff as boards, have been revived without apparent harm in experiments which may lead to successful preservation of whole body organs for long periods without loss of function.

Dr. Audrey U. Smith, of London's National Institute for Medical Research, says that by slowly freezing rats she was able to reduce their internal body temperatures to the freezing point and even a little below. After keeping them at these temperatures for an hour or more, she said, she revived them by quick rewarmings.

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Woomera Rocket Range, in central Australia, will be used as the launching site for a new international space program. Great Britain and seven West European nations plan to launch a satellite from the range in 1965. Great Britain's Blue Streak rocket will be the first stage; the second stage will be French-made and the third will be built in West Germany.



Avalanches will trip themselves up in British Columbia. Wires will be strung across avalanche paths that cross the Trans-Canada Highway. When a wire is broken by pushing snow and ice, a radio transmitter will send out a signal, alerting road crews where to come to clear the highway.



Hypertense people behind the Iron Curtain are getting treatment in a biotron—a chamber which regulates "temperature, relative humidity, barometric pressure, oxygen content, and ionic content."

This therapy, says a Soviet report, restores "the defensive forces and reserves of the human organism without the use of any chemotherapeutic agents."

Five hundred edgy Russians have been restored by this treatment.



And the sea gave up fresh water. Israel is operating the first of a new type of salt-water converter. About the size of a small household oven, it has a capacity of 250 gallons a day and can make drinking water from underground salt water—drawn about 10 miles south of the Dead Sea and some 1200 feet below that fabled body of water. Salt is removed by means of electricity and membranes.



A "window" in the top of the tuna's head interests Canadian scientists. Nova Scotia Fisheries' Department says this tiny hole, covered by a transparent tissue, may mean the fish's migrations are the result of seasonal sunlight changes. The hole is connected to a tube leading to the traveling tuna's brain. ★ ★ ★

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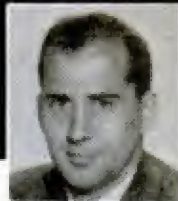
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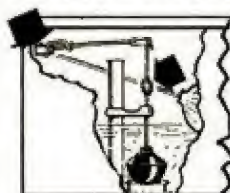
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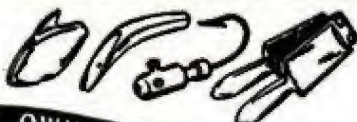
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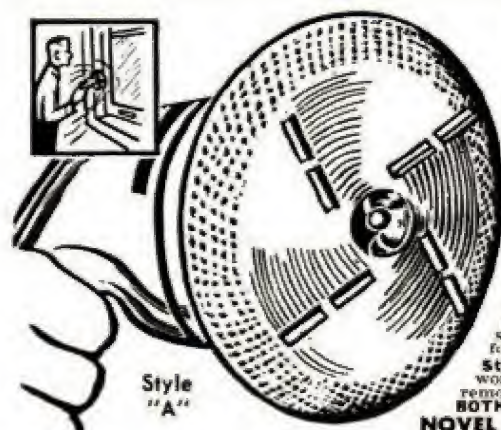
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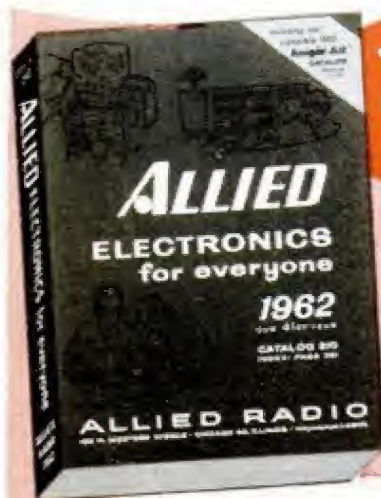
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Sidelights on aviation

Air prophets are again dusting off their shopworn predictions about the big boom in private flying. By 1970, they say, more than 100,000 noncommercial aircraft will fill the skies. More than half of these will be for business use and another 25 percent for pure pleasure.

Their predictions are based primarily on the fact that only 12 percent of the 3000 top industrial firms in the U.S. fly their own aircraft, leaving an untapped reservoir of 88 percent, or more than 2600 large firms; also, they say, thousands of professional men and small business firms could use aircraft profitably.

✓ ✓ ✓
A plastic airplane? Piper Aircraft Corp., which built the famous Cub, is working on one and it's due to fly this spring.

The wings, fuselage and tail will all be made of plastic, reinforced with glass-fiber cloth and paper honeycomb. Each major component will be built by joining two halves that have been formed in molds.

The two-place aircraft will probably cost in the same price range as current light planes, around \$5000. It will cruise about 130 miles per hour.

✓ ✓ ✓
Despite the secession of its Air Corps, which broke off to form the independent Air Force in 1947, the Army still has a considerable fleet of aircraft.

Most of them are used for reconnaissance, and require short, and sometimes vertical, takeoff and landing characteristics. The Army's newest airplane, now under construction, will be a VTOL jet capable of vertical takeoff and forward speeds up to 500 miles per hour.

Two jet engines will drive lift fans mounted horizontally in the wings. The fans will provide lift for vertical maneuvers and, more important, for hovering. For forward speed, the power of the jets will be diverted rearward for conventional thrust.

✓ ✓ ✓
"Made in Japan" will be imprinted on a unique new helicopter scheduled for tests next summer. Few details are available, but it will have three-bladed counter-rotating rotors mounted inside a ducted shield. The teardrop-shaped cockpit will seat one or two persons. It will cruise at 65 miles per hour.

Kevin V. Brown

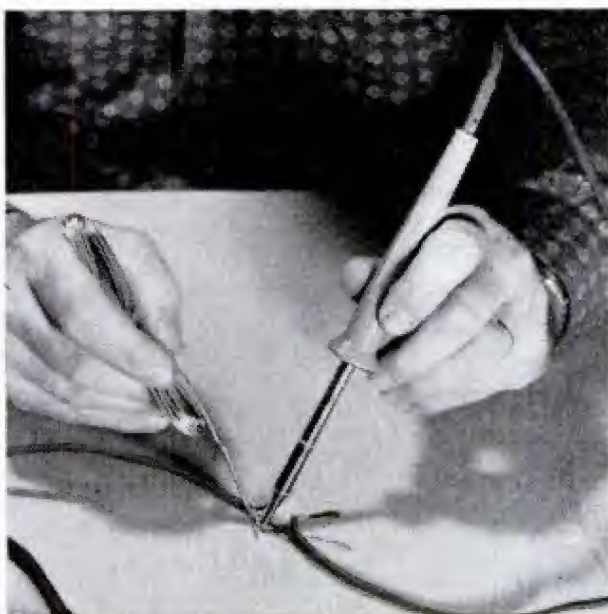
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Small and lightweight, a new electric soldering iron has interchangeable plug-in tips and heater assemblies.

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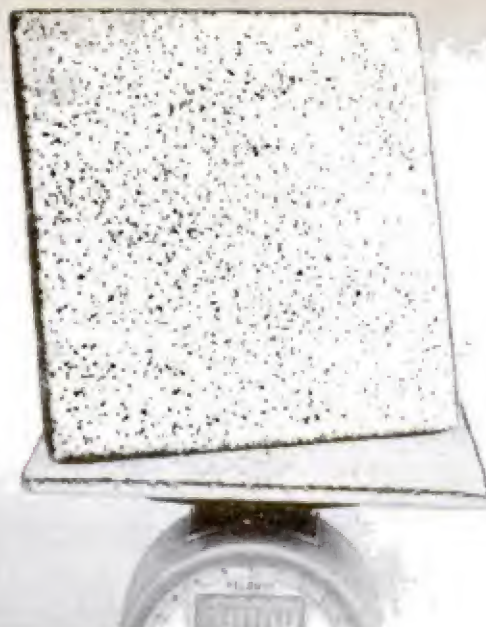
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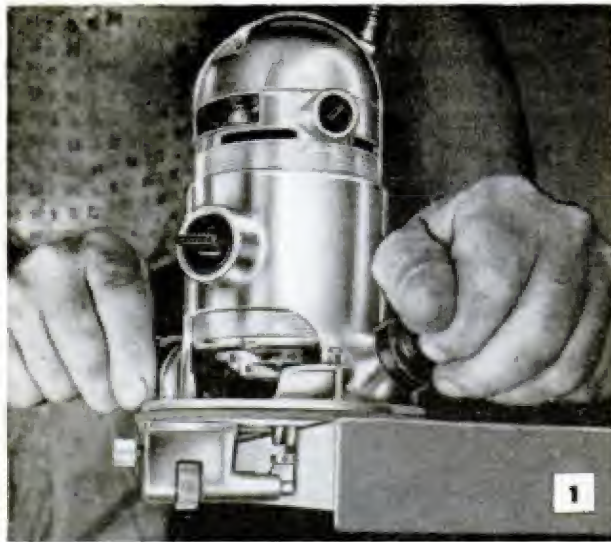
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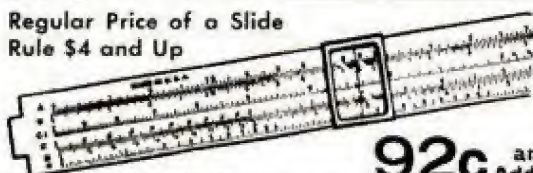
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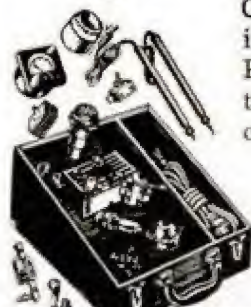
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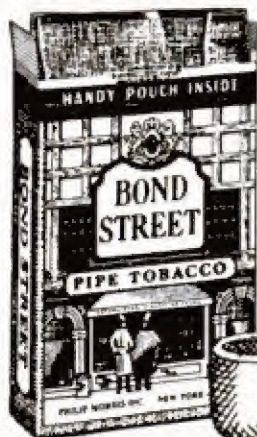
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Bond Street Pipe Tobacco keeps burning because of its old English cut — a combination of flakes for even-burning and cubes for slower-burning. You'll like its aroma of fine imported and domestic tobaccos, too.

It's a virtuous son who inherits his father's pipe.



BOND STREET

A product of
Philip Morris
Incorporated

No-Hands Carrier Landings

Ten Navy aircraft carriers will have an automatic landing system installed that will permit hands-off landings under adverse weather conditions.

The system, developed by Bell Aerosystems Company, electronically guides an approaching aircraft to the deck without the pilot being required to touch pitch-and-bank controls or even to make visual contact with the carrier, as in fog.

The system assumes control of an aircraft when it is several miles from the carrier. Precision radar tracks the airplane and relays its position to a computer. The computer compares the aircraft's position with that of the carrier and generates control commands which are radioed to the aircraft's automatic pilot. The automatic pilot, in turn, controls the aircraft, holding it on a proper flight path.

A land-based version has been studied for possible commercial application.

Probe to Peek at Mars

Is there any life on Mars?

By 1964 we may have an answer. A program to send a space probe with a telescope to photograph the planet by visible and infrared light is under way. The probe could reveal if organic molecules—the building blocks of living forms—are present.

The probe would circle to within 20,000 miles of Mars. Mars is 48 million miles from Earth. Previous infrared spectroscopy done with the 200-inch Mount Palomar telescope indicates that these molecules could exist on Mars, but the evidence from that distance is not clear-cut.

Super-Slow-Speed Motor

Featuring a controlled speed range with-out gearing of from 500 revolutions per minute down to $\frac{1}{400,000}$ r.p.m. (one revolution every 41½ days), a hydraulic motor may have applications all the way from machine tools to space vehicles.

Another outstanding characteristic is its high-response rate. From 100 r.p.m. it will stop, reverse direction and accelerate to 100 r.p.m. within $\frac{1}{10,000}$ of a second.

Originally developed by the Cimtrol Division of Cincinnati Milling Machine Co. of Cincinnati, Ohio, as a positioning drive for its machine tools, the motor may ultimately be used for controlling the orientation of large, precise instruments such as a satellite-tracking antennae, for optical-maser aiming, for navigation, for chemical control, or for missile guidance.

The completed motor weighs 138 pounds, and measures 12½ inches by 6 inches deep. It's called the Acradrive/22.



PROFESSIONAL INVESTIGATORS WANTED!

NORTH AMERICAN INSTITUTE OF POLICE SCIENCE

WILL IMPROVE YOUR SKILL

ONLY THE SKILLED INVESTIGATOR CAN EXPECT A BETTER JOB AND HIGHER SALARY.

NOW YOU CAN TRAIN BY MAIL FOR HIGHER POSITIONS IN DETECTIVE POLICE OR INVESTIGATIVE FIELDS UNDER THE GUIDANCE OF MEN OF PROVEN ABILITY. ALL IMPORTANT PHASES OF INVESTIGATIONS COVERED BY SUCH NOTEWORTHY EXPERTS AS CAPTAIN JOHN I. HOWE (former Captain of Police, Chicago, and lecturer at various Police schools) AND PAUL D. NEWBY (former Chief, State's Attorney's Police, Cook County, Illinois; and Federal Agent). GRADUATES CAN BECOME PAID CORRESPONDENTS, AS NEEDED AND IF DESIRED, IN THE INTERNATIONAL NETWORK OF NORTH AMERICAN DETECTIVE AGENCY'S FORCE. FOR INFORMATION ON THE 20 WEEK COURSE AND CERTIFICATE,

WRITE: 608 S. Dearborn St., Suite 863, Chicago 5, Ill

Worship
together
this
week



You need not walk alone!

RELIGION IN AMERICAN LIFE, INC.

Published as a public service in cooperation with The Advertising Council.

CONCRETE BIRD BATHS AND OVER 250 OTHER MONEY MAKING ITEMS



You've seen them all over the country... concrete bird baths, garden seats, flower boxes, appealing statuary, and many other items that add charm around the house and lawn. They're made by enterprising people, just like you, from our COPYRIGHTED ALUMINUM MOLDS. It's easy. It's fun. It's profitable.

Send \$2.00 today for this 62-page "How to" book, 20 pages of clear instructions. Valuable trade secrets. Over 250 items beautifully pictured (with description, dimensions, and prices of molds). Rushed to you by first class mail.

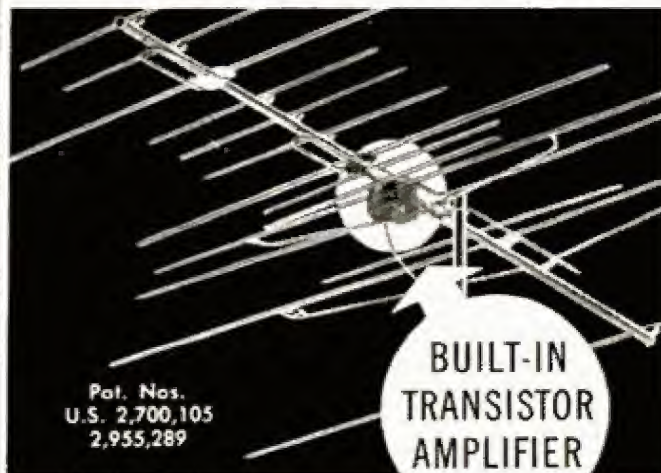
CONCRETE MACHINERY CO., INC.
HICKORY 2, NORTH CAROLINA

Name _____

Address _____

HOW TO
TURN
CONCRETE
INTO
GOLD

WINEGARD ELECTRONIC TV ANTENNA INVENTION



Pat. Nos.
U.S. 2,700,105
2,955,289

BUILT-IN
TRANSISTOR
AMPLIFIER

GIVES YOU POSITIVE TV IMPROVEMENT

clears up snow and interference,
increases reception distance.

The Winegard Powertron is a new *electronic* antenna that will make a big improvement in your TV reception. For instance, for long distances, the Powertron will pull in TV pictures hardly visible with an ordinary antenna.

There are two reasons for this unusual performance: The Powertron has a patented Electro-Lens system that intercepts and focuses TV signals on the collector element. Here the signal is *amplified* by a built-in transistor. The result: In most cases, you can enjoy more channels. Pictures that were poor to fair become sharper... brighter. Snow and interference is reduced. Excellent for color or black and white.

Besides being electronically superior, the Powertron is mechanically strong and will deliver fine performance for years. It has a lustrous gold anodized finish that won't corrode or turn dull. If you and your family want better reception, the Winegard Powertron is a wise investment. See your TV dealer, or for more information, send coupon for booklet.



Winegard
ANTENNA SYSTEMS
3001-2 Kirkwood • Burlington, Iowa

Winegard Co., 3001-2 Kirkwood, Burlington, Iowa

- ☐ Send FREE booklet on Powertron
- ☐ Send folder on easy way to install TV antenna plug-in outlets in each room in my house.
- ☐ Send information on long distance FM reception.

Name _____

Address _____

City _____

State _____

My nearest TV station is _____ miles away

NOW! COPPER SWEAT JOINTS THE EASY WAY!

SWIF SOLDER



Make perfect leak-proof sweat joints every time with Hercules SWIF Solder, the real 50/50 tin-lead solder pre-mixed with flux in easy-to-use paste form. Save time and money, too. Just brush on, join, and heat for neat, strong joints. SWIF solders all common metals (except aluminum) and works with a torch, soldering iron, or soldering gun. This grade available in economical 4 oz., 1/2 lb., 1 lb., and 3 lb. cans at your plumbing supply or hardware dealer. See for yourself how easy any soldering job is when you use SWIF.



Write for free do-it-yourself
soldering folder.

Hercules Chemical Co., Inc., 416 B'way, N.Y. 13

START A BUSINESS this quick way



with these 2 machines
you can sharpen

**ALL HAND AND POWER
LAWN MOWERS**



**FOR ROTARY POWER
MOWER BLADES**

The Foley 314 Grinder
puts a perfect cutting
edge on all rotary power
mower blades.

Here's a business you can start in spare time, and begin to make a CASH PROFIT right away. The Foley Lawn Mower Sharpener handles up to 3 or 4 reel type mowers per hour. Prices run \$2.00 to \$3.00 for hand mowers, \$3.00 to \$8.00 for power mowers. You get 90¢ profit out of each dollar.

With the Foley Grinder you can sharpen rotary power mower blades, rip, cross-cut and combination circular saws, dado heads, ice skates, knives, scissors, shears, all sharp-edged tools.

FREE PLAN tells how to put yourself right into a home business that will pay you \$3 to \$6 an hour. Send coupon today for **FREE BOOK** on how to sharpen power mowers and Special Combination Money Saving Offer. No obligation—no salesman will call.



FOLEY MFG. CO.
207-2 Foley Bldg., Minneapolis 18, Minn.
Send Free Plan on lawn mower business and
Special Combination Offer.

NAME _____

ADDRESS _____

Items from all outdoors

Does your boat still carry a fire extinguisher that uses carbon tetrachloride, chlorobromomethane (there's a mouthful), or some other toxic vaporizing liquids? Though such types are fast disappearing from the scene, many are still around on boats. But the first of January was the cutoff date for their use under Coast Guard regulations—they're now illegal. Better check your extinguisher. The three legal types are chemical foam, CO₂, and dry chemical.

As this issue goes to press, PM's outdoors editor returns from a visit to Outboard Marine Corporation's test station at Naples, Florida. There I had a chance to test drive OMC's long-awaited three-point boat (see page 115). And, true to their promise, the designers proved that their radically-new hull has everything they predicted. It's fast (over 30 m.p.h. easily with four adults aboard), runs dry and level, comes up on a plane quickly and stays up at very low speeds. In short, it is easily the most stable, best-handling multikeeled boat I've ever driven. What's more, while more familiar multikeels are notoriously rough riders in a chop, the new boat smoothes out the bumps surprisingly well. By the time they're available this spring, their 80-horse two-cycle powerhead will be optionally-equipped with *direct fuel injection* for better acceleration, smoother performance and an estimated 30 percent cut in fuel consumption.

One of the big problems in correcting bad golf form is finding out where you're hitting the ball with the club face. It's impossible to tell by watching the impact—it all happens too fast for your eye to see. But a new training aid called Spot-Shot does the job. It's an adhesive tab that sticks over the club face and retains the impression of the ball after you've hit it. Since most topping, skying, hooks and slices are caused by hitting the ball with the wrong area on the club face, you can quickly spot your trouble and work to correct it. You get three tabs, each one good for 100 erasable impressions, and an indexed instruction book for \$1.25. It's made by the Spot-Shot Co., Box 158, West Covina, Calif.

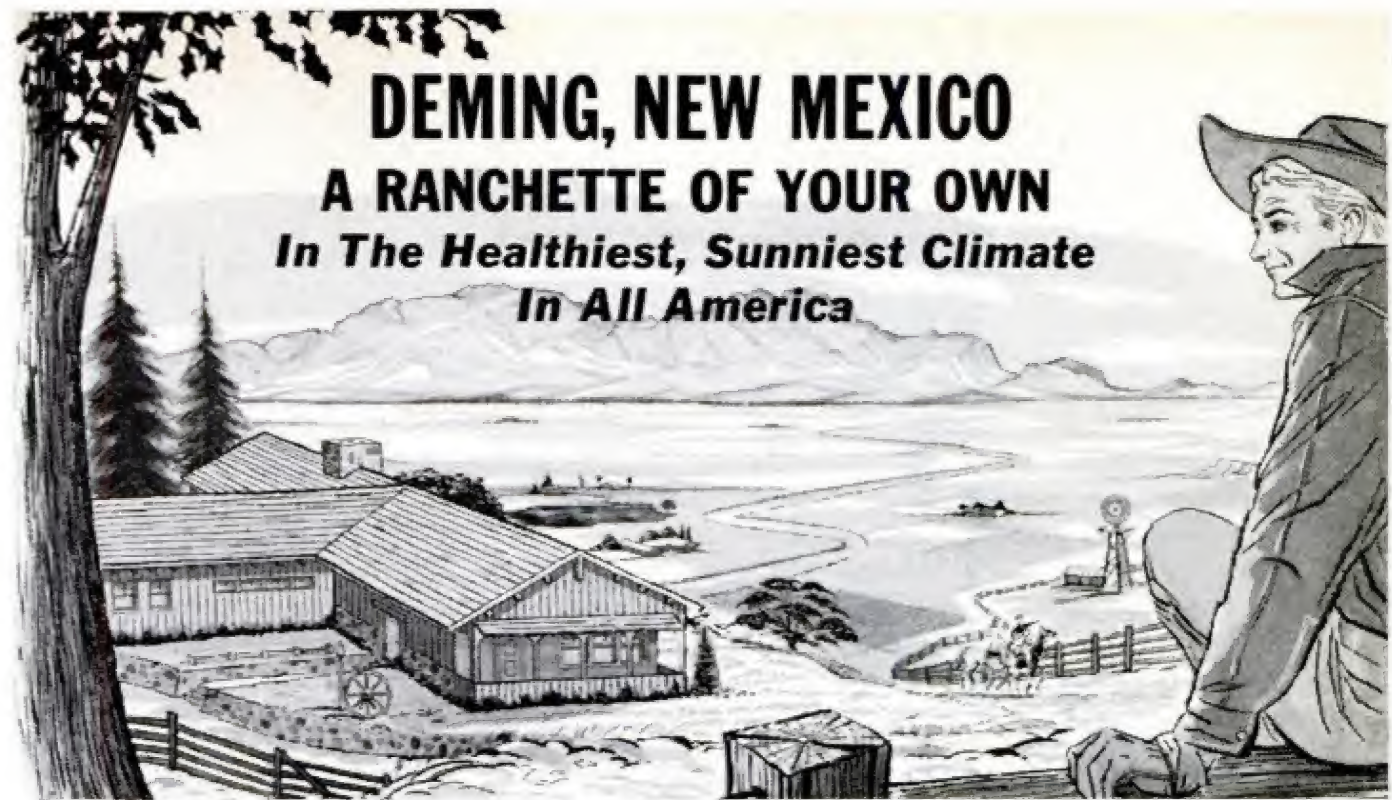
Dick Liekpatrick

POPULAR MECHANICS

DEMING, NEW MEXICO

A RANCHETTE OF YOUR OWN

In The Healthiest, Sunniest Climate In All America



\$199 PER HALF ACRE

There is a broad ribbon of highway that begins in the heart of Savannah, Georgia and winds for 3000 miles to its terminus in exciting Los Angeles. This ribbon is mighty Route 80—the most travelled all-weather highway in the U.S. Millions of Americans have followed it to the West, coursing through the rich hills of Georgia and Alabama, passing through the heart of Mississippi and Louisiana and entering into the plains of Texas. Gradually the scenery begins to change. Texas begins to roll; distant hills become higher. Then suddenly one emerges into "The Land of Enchantment." New Mexico's wonders erupt in a blaze of color and majesty. The mighty mountains thrust themselves, tree-topped, into the unimaginable blue of the sky. Dust and smoke have vanished from the air and the lungs drink in great delicious draughts in heady delight. If it is wintertime snow may cap the lofty mountains. If it is spring or summer or fall the unspoiled air touches the skin softly and the feeling of well-being is nowhere else equalled. But winter or summer, it is almost certain the sun will be shining in New Mexico—the sunniest, healthiest state of all 50. Yet great 80 is just beginning to take you through the sunshine wonderland of America. In the tropical southwestern pocket of our country you glide through towns like Las Cruces and Deming. A short while westward and you are in Tucson and Phoenix, Arizona, and from there the West Coast beckons. But nowhere in this enchanting Southwest is there a more beautiful area than the mountain-rimmed, pure-aired New Mexico region of Las Cruces and Deming.

To live anywhere in New Mexico is to live better. The superb climate, naturally air-conditioned in the summer and brilliantly sunny in the winter—the breathtaking beauty of a lavish Nature—the young vigor of a state that is causing an unprecedented business and investment boom—the record which shows that one lives longer, that health improvement is almost miraculous—these are the reasons that tens of thousands of Americans already have come here to live, and hundreds of thousands of others will be following in the immediate years ahead.

Consider then: Here in the center of this miraculous climate and beauty are towns which have grown amazingly in the last 10 years. Las Cruces, for example: In 1950 it had 12,000 people. By 1960, 37,000... a rise of 300% in 10 years! (How about your town? Has it grown 3 times its size in 10 years?) Like Tucson and Phoenix, this area is a beautiful semi-tropical paradise where palm trees and long staple cotton-fields flower the landscape. Statistics show the same 85% of possible sunshine, summer and winter; these same figures reveal even purer, drier air than in Phoenix or Tucson.

A few minutes from the flavorful city of Deming (population 8,000) is a 5,000 acre Ranch, picture-framed by the breathtaking Florida Mountains. So real, so beautiful, so typically the romance of the Southwest is this valley Ranch that it has been photographed for the covers of many magazines including the official publication of the State of New Mexico. What better way to describe its Southwestern flavor than to tell you that when the producers of the movie THE TALL TEXAN sought an authentic locale for their picture, they chose the very land we are now sub-dividing into the DEMING RANCHETTES. THE TALL TEXAN was filmed on our ranch, the same place where you may have a Ranchette of your very own!

This is the lovely basin of land where heavy equipment is now at work constructing wide roads facing every DEMING RANCHETTE. Every Ranchette will have direct access to avenues leading to three major highways surrounding our property—U.S. Highways 80, 70 and State Highway 11.

\$5 DOWN \$5 PER MONTH

DEMING RANCHETTES is blessed with water which is called "America's finest drinking water, 99.99% pure." (Almost every shop in Deming displays this proud claim in its window.) Home building has already begun in DEMING RANCHETTES and electric lines and telephone connections await you. Schools, hospitals, churches, shops, theaters, golf course, tennis courts—these are close by in the charming growing city of Deming. Fertile soil is yours for the planting, and wait until you see the stunning landscape of cotton fields in bloom. Fruit trees... apple, peach, pear and plum... do not grow better anywhere.

And the price of your Ranchette? Just \$199 complete for a half-acre, \$5 down and \$5 monthly. That's the complete price—no extras, no interest, no taxes! At this moment you may reserve as many half-acre sites as you wish but please bear this in mind: DEMING RANCHETTES is not an enormous development and land such as this goes fast. At these prices you may want your Ranchette to be larger—one, two—even five acres. An immediate deposit will guarantee that your half-acres will adjoin each other (this may not be so in the near future). And you take no risk in sending your deposit. Your \$5 per half-acre will definitely reserve your land but does not obligate you. You have the unqualified right to change your mind 30 days after we send you your Purchaser's Agreement, Property Owner's Kit, Maps and Photographs—30 full days to go through the portfolio, check our references, talk it over with the family. If, during that time, you should indeed change your mind your reservation deposit will be instantly refunded. (Deming and Albuquerque Bank references.)

Ten years ago, in nearby Las Cruces, a comparable fertile half-acre such as we offer in DEMING RANCHETTES could have been bought for \$199. Today it's up to \$2000! Experienced realtors predict the same future for Deming—in a much shorter time! If this makes sense to you your next act is mailing the coupon below. And one more thing: we promise that no salesman will annoy you. Thanks, sincerely, for your attention.

DEMING RANCHETTES DEPT. L-6
112 West Pine Street, Deming, New Mexico

Gentlemen: I wish to reserve the following site in Deming Ranchettes:

- ☐ ½ acre for \$199. I enclose \$5 as a deposit.
- ☐ 1 acre for \$395. I enclose \$10 as a deposit.
- ☐ 1½ acres for \$590. I enclose \$15 as a deposit.
- ☐ 2½ acres for \$975. I enclose \$25 as a deposit.
- ☐ 5 acres for \$1925. I enclose \$50 as a deposit.

Please rush complete details, including my Purchaser's Agreement, Property Owner's Kit, Maps, Photographs and all data. It is strictly understood that I may change my mind within 30 days for any reason and that my deposit will be fully and instantly refunded if I do.

NAME.....

ADDRESS.....

CITY.....

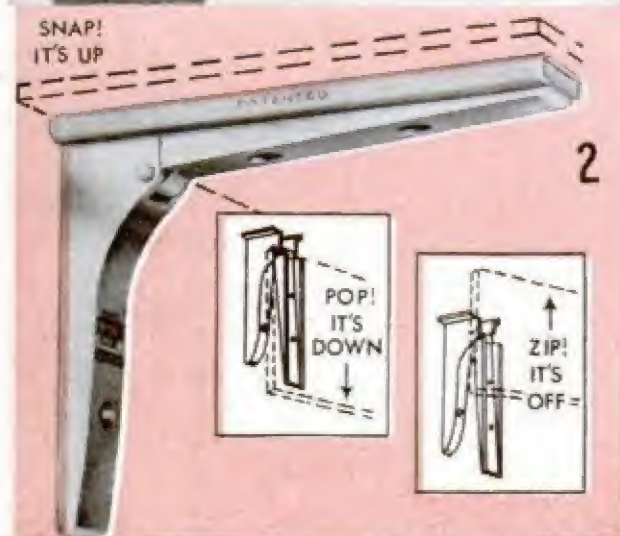
ZONE.....

STATE.....



On the market

1. ALL-PURPOSE PATCHING PLASTER with vinyl combines durability of plaster with resiliency and bonding strength of vinyl. Material can be troweled on as thin as paint or, when mixed with sand, used as economical fill for large areas. It is especially effective as joint cement for wallboard. Plaster-All Products, 5150 N. Western Ave., Chicago 25, Ill.



2. REMOVABLE FOLDING BRACKET is ideal for shelves, tables, seats, and counters where floor space is at premium. Shelf may be removed for storage or quickly replaced by another shelf on same brackets—especially useful in boats and house trailers. Price of brass bracket is \$4.98. Standard-Keil Hardware Mfg. Co., 2581-85 Atlantic Ave., Brooklyn 7, N. Y.



3. VINYL SLATE TILE combines the character of quarried slate with the advantages of vinyl asbestos. Suitable for on, or below-grade installations, material is warm and resilient underfoot. It is available in five realistic stone colors—with the colors and pattern going all the way through for maximum wear. B. F. Goodrich, 800 Second Ave., New York 17, N. Y.

4. EPOXY CEMENT in a two-component package solves the problem of mixing small quantity of this fast-drying material. Catalyst and resin are sealed in vacuum-formed plastic container—one in center, other in separate concentric ring. Stick is used to push down center; then components are mixed directly. Plastic Assoc., Box 36, Laguna Beach, Calif.

5. PLASTIC ELECTRICAL TAPE is now available with a taping dispenser in a new economy size. The tough, black tape can be cut easily and cleanly on the cutting edge which forms part of the dispenser. Also, the position of the end tab makes the tape convenient for instant use. Marketed by the Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.



(Advertisement)

A number of one-man mail order enterprises are paying their owners an income of \$40,000 to \$50,000.

SPECIAL OPPORTUNITIES



Mail order is big business. Annual catalog sales volume of Sears, Roebuck and Co. is over 700 million dollars!

HOW TO START

Your Own Mail Order Business

You can make a fortune by mail. New firms will set you up in a fabulous mail order business of your own! They'll make up your catalogs, prepare your advertising, supply mailing lists and even ship your products for you!

By Robert Stephenson

When Anthony Sambati injured his back and was laid off from work he never dreamed it would be a blessing in disguise. Bedridden for weeks, he decided to start a small mail order business. This was something he could run right from his own home and required very little capital to begin. In fact, Sambati started with less than \$85.00.



After a short time in mail order, Sambati soon had a beautiful home with all the luxuries of a successful businessman.

He figured that a small mail order business might provide a temporary income to support his family until he got back on his feet. His first step was to obtain a franchise from a large wholesale mail order firm which supplied him with all the necessary catalogs and mailing literature. It wasn't long until his spare-time venture blossomed into a booming enterprise. Drawing a small salary and pouring the rest of the profits back into the business, he soon had others working for him! Today he owns a large retail store, his own warehouse and a beautiful home with all the luxuries of a successful businessman.

Sambati's story is typical of a number of men and women who began a small mail order business with absolutely no previous experience, and made a huge success of it. These 'little' people are quietly pocketing big profits every day—many content to keep the business small . . . spending an hour or two each day in the privacy of their own home. No bosses, time clocks or small pay envelopes. No door to door selling, in fact, you never even meet your customers face to face.

Yes, a small one-man mail order business is ideal for anyone wanting a chance to gain financial security and independence. Yet thousands try mail order each year and fail, simply because they don't learn the few simple secrets of success early in the game.

Take the case of Bud Sheer who had been working for a theatre in a small New Jersey town. With only a few hours spare-time to spend each morning, he tried mail order to supplement his regular income. Like many beginners in this field, Sheer was faced with the problem of finding good mail order items which would have a high mark-up and repeat sales potential. But the biggest obstacle was the expense of printing a catalog.

Then he heard about the A. J. Statile Co. of Hillsdale, New Jersey — an organization set up to aid the small mail order beginner.

He wrote to A. J. Statile Co. for full information, sent in his application for a franchise and within a short time the cash began rolling in. Today Bud Sheer owns the theatre he once worked for. Sheer attributes his success in mail order to the A. J. Statile Co. Actually, the theatre he owns has become a side investment.

He still uses the beautiful 300 page mail order catalogs supplied by A. J. Statile Co.

How does the Statile Co. help the beginner get a sound start in mail order? Very simply. Just as Henry Ford made automobiles within the reach of the general public—by mass production and large volume.

Let's take a few specific examples:

(1) All franchised dealers of A. J. Statile are offered ready to mail catalogs and sales literature. Each mailing piece has the dealer's name and address printed right on it. By printing millions of catalogs, Statile is able to offer these at a fraction of their regular cost. The artwork and layout costs for these catalogs would run into thousands of dollars for the beginner if he were starting from 'scratch'.

(2) Since all mailing material and catalogs contain your name and address, all orders come directly to you. Yet you don't have to invest one penny in inventory. All merchandise is stocked for you. In fact Statile has over \$3 million dollars worth of mail order merchandise at your disposal.

(3) All packaging and shipping is done for you. You simply send a shipping label to Statile together with the wholesale cost of the items, and the merchandise is shipped directly to your customers under your own shipping label.

(4) A consultation service is provided to answer any questions you may have. You receive a secret list of over 100 national magazines which run free ads. You'll be shown how to obtain free publicity on your own mail order items. In addition, you obtain trade names and addresses of over 150 other mail order wholesalers who drop-ship top mail order items for you. You'll also be given all the government laws and regulations pertaining to a home operated mail order business. These laws are a 'must' for all beginners.

All this valuable information is covered in the Statile Mail Order Survey which every new franchised dealer receives from Statile before they begin. Formerly sold for \$25.00, this survey has become the 'bible' of the trade. Mr. J. M. of Baltimore, Md., writes, "To tell the truth, all the information in regard to obtaining free ads is alone worth the \$25.00 I paid you . . ." J. D. of Kalamazoo, Mich.,

states, "Just a personal note to say I am most satisfied with my \$25.00 investment. Your sales plan is simple and well organized . . ." These are only a few of the many testimonials received praising the Statile Mail Order Survey.

(5) The catalogs and mailing literature offered by Statile Co. cover every conceivable mail order item. You select the field you are interested in . . . BABY ITEMS, TOYS, APPLIANCES, VITAMINS, BOOKLETS AND



The thrill of receiving money in your morning mail is one you'll never tire of.

MAIL ORDER COURSES, you name it, Statile has the catalog or mailing piece. Select your market, order your mailing literature and you're in business.

(6) You'll be told how to compile your own mailing lists—and this is the most important part of your business. Many a beginner has fallen by the wayside simply because he mails his catalogs to a poor list of names. Suppose, for example, you offered a beautiful scale model of a 40' Chris-Craft cabin cruiser by mail. You would probably make your mailings to boating enthusiasts and the chances are that nine times out of ten your mailings would show a loss instead of a profit. How would Statile help you solve this particular mailing list problem? He would show you where to get the names and addresses of *actual owners* of 40 foot Chris-Craft cabin cruisers! Surely every owner would like to have a scale model of his own boat. Strange as it may seem, such a mailing list is available to anyone. The secret is where to find it. This is just one example of how an experienced mail order expert giving you personal advice, may mean the difference between success and failure!

This same method of obtaining selective specialized mailing lists may be applied to practically any market . . . selling baby items to new mothers, selling toys to young children, etc., etc.

So much for starting your own mail order business. Now, a word of caution. **OBTAIN YOUR MAIL ORDER FRANCHISE FROM A**

REPUTABLE MAIL ORDER FIRM. Unfortunately, during the past few years a number of ads have appeared in newspapers and magazines offering to start people in mail order. The ads are grossly misleading. Many imply that you can become a millionaire over night if you use their catalogs. Beware! Particularly if they operate their own mail order business direct to the consumer. These firms compete with their own franchised dealers! They could just as well mail all the catalogs themselves. They don't need you.

Other shady firms fail to drop-ship your orders promptly, thereby losing customers for you. In mail order, prompt shipment is an absolute requirement for a successful operation.

Deal only with firms whose business is preparing catalogs and shipping merchandise. They operate on a strict wholesale basis for franchised dealers exclusively. Such a firm is the A. J. Statile Co. Letters from successful franchised mail order dealers speak for themselves. A woman from Milwaukee writes, "It has been better than my expectations." A gentleman from California states "we are quite pleased with the response we are receiving." Another man from Wisconsin writes, "To say the least, I am more than satisfied."

Yes, a small mail order business offers you an opportunity to earn a second income, or—if you work at it in earnest, a chance to strike it rich. The young housewife in St. Louis may be content to make an extra \$20.00 a week . . . the office worker in Los Angeles may be aiming for \$150.00 weekly full time business . . . and the ambitious schoolteacher in Newark may reach \$20,000.00 a year. What is your objective? Set your own goal, pick your own hours, and the sky is the limit.

Even a government report stated that a number of the most successful one-man mail order enterprises make as high as \$40,000 to



Big firms will carry all stock for you. They ship orders direct to your customers using your own shipping labels.

(Advertisement)

Your Own Catalogs of Top Mail Order Items!



A. J. Statile Co. will prepare your catalogs, write your sales letters, supply mailing lists and even ship merchandise for you, using your own shipping labels!

\$50,000 a year! But frankly, this is the exception rather than the rule. Most mail order operators are content to earn a comfortable living doing little physical work, but enjoying their work thoroughly! We don't say you'll be a mail order millionaire or another Sears & Roebuck, but if you're looking for a business of your own with financial security, the answer is mail order. If you've already tried mail order with little or no success, don't give up! Try to analyze what went wrong. Success comes only to those who keep trying and learn from their own mistakes. Again we emphasize, deal only with a reputable firm.

The A. J. Statile Co. has been in business for over twelve years.

They gladly furnish bank or trade references upon request. They are probably one of the largest mail order wholesalers in the country. Whether it be toys, gifts, vitamins or appliances—they've got it ready to ship under your label **WITHIN 24 HOURS!**

Firmly convinced that no other business offers the tremendous opportunities of mail order, A. J. Statile, president of the firm, is an outspoken advocate of the man or woman who wants to start in business for himself. As Statile puts it, "by all means, start your own business and start **NOW!** If you want a chance at security and financial independence make your choice mail order. There's nothing like it. Absolutely nothing!"

FOR FREE DETAILS

Mail coupon below — no obligation

A. J. Statile Co., Dept. 28 • Statile Building • Hillsdale 28, N. J.

Dear Mr. Statile:

Please send me complete **FREE** details telling me how I may obtain a franchised mail order dealership with your firm. I understand I am under no obligation and no salesman will call on me.

NAME..... AGE..... SEX.....

ADDRESS

CITY..... ZONE..... STATE.....

PREVIOUS EXPERIENCE, IF ANY.....



VACATION WITH LOW-COST! COLORIB!

BUILD patios, fences, boathouses and vacation homes with Alcoa® Aluminum Colorib® Panels.

GOES UP FAST AND EASY—Use simple hand tools. Heavy-gage yet lightweight, covers fast.

ONCE UP, NO UPKEEP—Won't rust, rot or warp.

TOUGH AND HANDSOME—Finish won't chip, crack, flake, peel or blister. Baked enamel Colorib Panels stand up to wind, rain and snow.

WRITE IN TODAY—for Colorib Panel Idea Folder and where you can get **FREE PROJECT PLANS**. Send handy reply card, or write: Aluminum Company of America, 891-B Alcoa Building, Pittsburgh 19, Pa.



ALCOA PANELS IN 7 BRIGHT COLORS

Entertainment at Its Best . . . **ALCOA PREMIERE**
with Fred Astaire as host Tuesday Evenings, ABC-TV

FROM:

NAME _____

ADDRESS _____

CITY _____

ZONE _____

STATE _____

1st CLASS
PERMIT
No. 1174
Pgh., Pa.

BUSINESS REPLY MAIL

No Postage Stamp Necessary if Mailed in the United States

6¢ postage will be paid by

ALCOA COLORIB PANELS
ALUMINUM COMPANY OF AMERICA
891-B ALCOA BUILDING
PITTSBURGH 19, PA.



ALCOA ALUMINUM

COLORIB PANELS

You can light either end!

PALL MALL

FAMOUS CIGARETTES



"WHEREVER PARTICULAR
PEOPLE CONGREGATE"

"Wherever particular people congregate"

Pall Mall's natural mildness is so good to your taste!

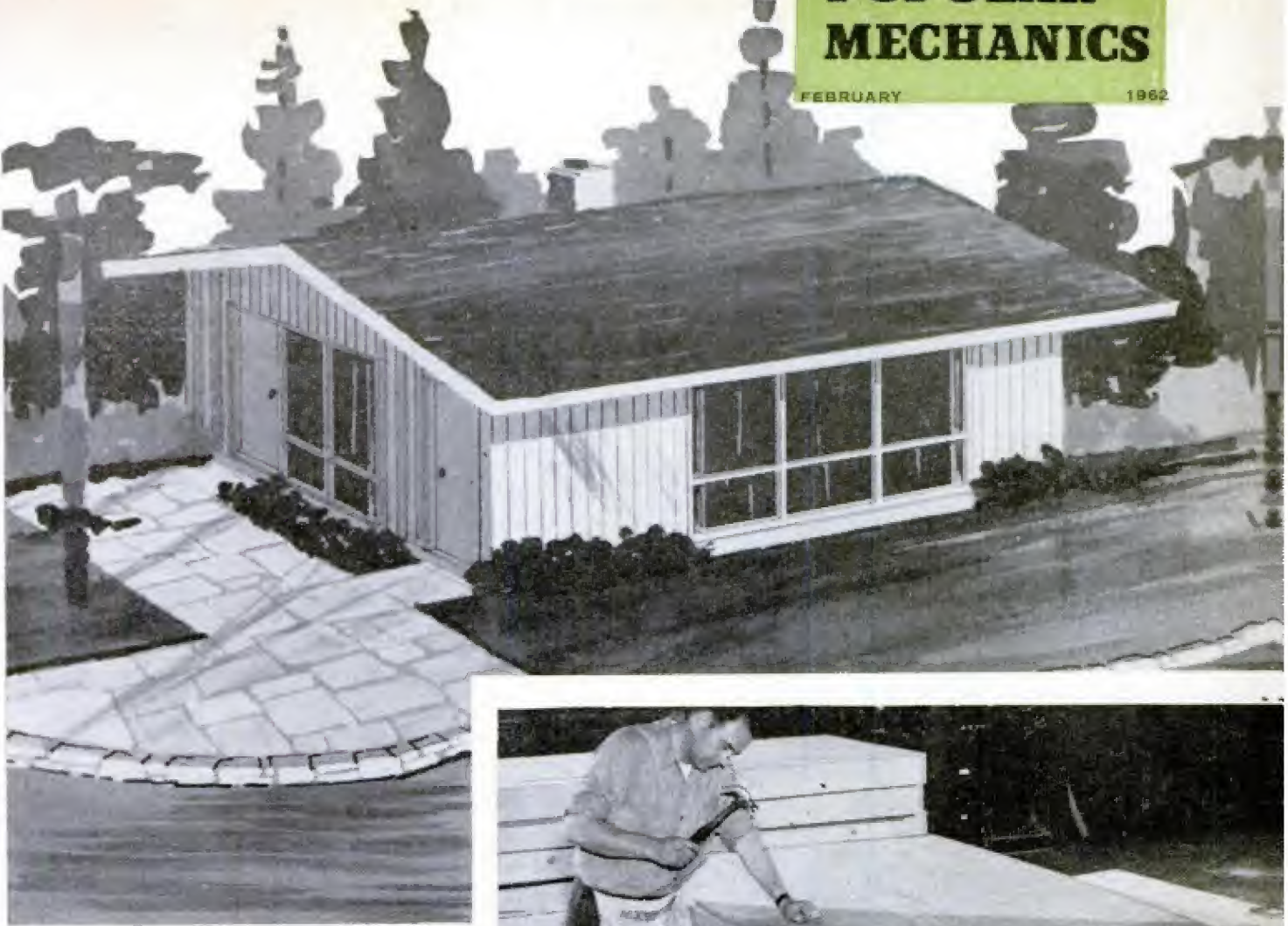
So smooth, so satisfying, so downright smokeable!

See how Pall Mall's famous length of fine tobacco travels and gentles the smoke naturally—makes it mild—but does not filter out that satisfying flavor. Never too strong. Never too weak. Always just right! Enjoy satisfying flavor...so friendly to your taste.

Outstanding...
and they are Mild!



Compare all three! Smoke "traveled" through fine tobacco tastes best. See the difference! With Pall Mall, you get that famous length of the finest tobaccos money can buy. Pall Mall's famous length travels and gentles the smoke naturally... over, under, around and through Pall Mall's fine, mellow tobaccos. Makes it mild... but does not filter out that satisfying flavor!

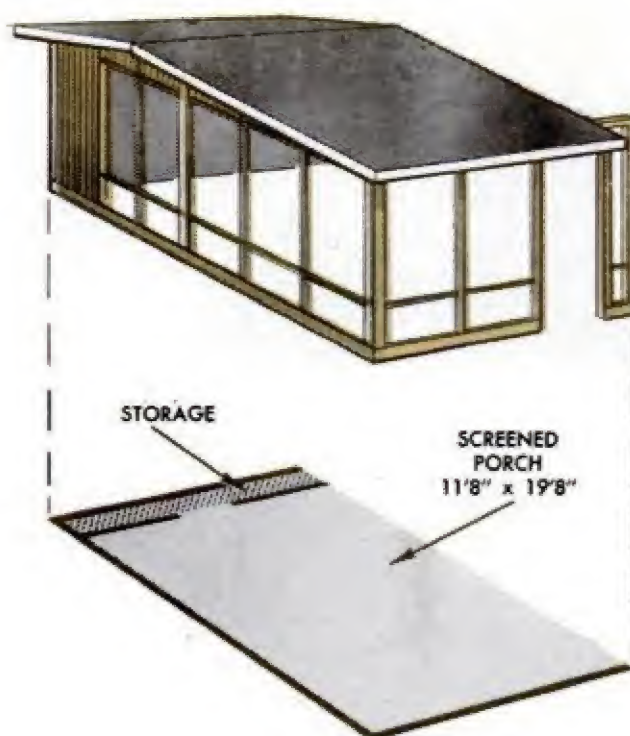


START YOUR VACATION HOME *at Home*

Prefab construction lets you build it in your basement during the winter, ready for trucking to a lakeside building site next spring



STAGE 3



PART I

EVER THOUGHT you'd like to build your own vacation home? You probably have the very spot already picked out, a choice site overlooking a beautiful lake where the family could spend a carefree summer and you the week ends, plus your vacation.

But who has the time to build his own vacation home? Traveling back and forth would leave little time for working, it would take forever to build it, it's just too big a project to ever consider as a spare time project.

Building a vacation home at some distant spot week ends is out of the question to be sure. But suppose you could get a head start by building at least half of it at home in your basement or garage?

In building such a home within your home *Popular Mechanics* editors knew that almost everyone would be faced with a shortage of time. The answer, obviously, was a simple modular affair, the floors and walls of which could be prefabricated at home in standard 4-ft. sections, stockpiled until spring and carted to the building site where they could be erected by the builder within a two-week vacation period. With this idea in mind, the editors commissioned Home Planners, Inc. to design such a vacation home, stressing that it should be built of stock dimensional materials and that it should go together like a set of toy building blocks. In addition, it was to be designed to grow with the builder's future needs.

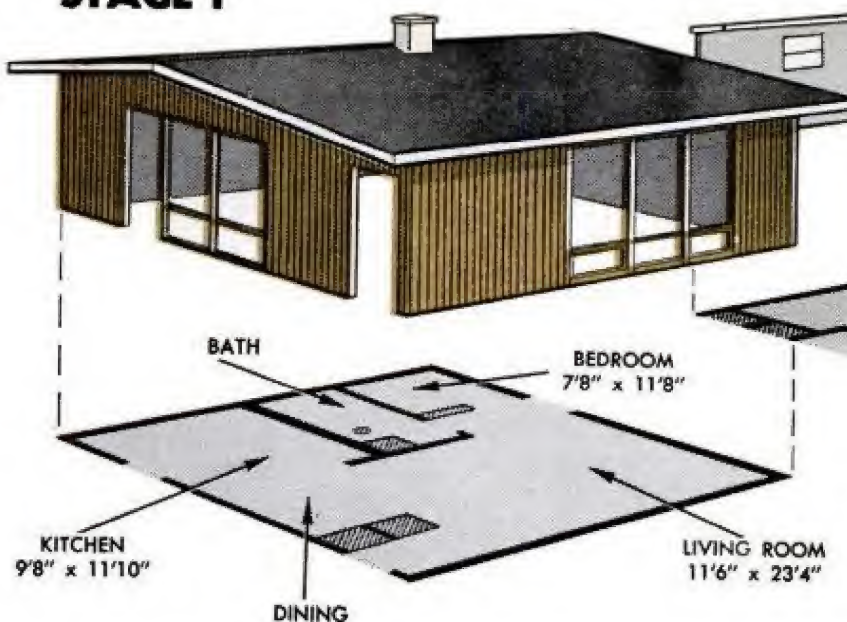
The vacation home you see here incorporates these basic requirements. Designed as a three-stage,

FOOTING FORMS are 2 x 4s, set on grade, then dug out for an 8-in. poured footing

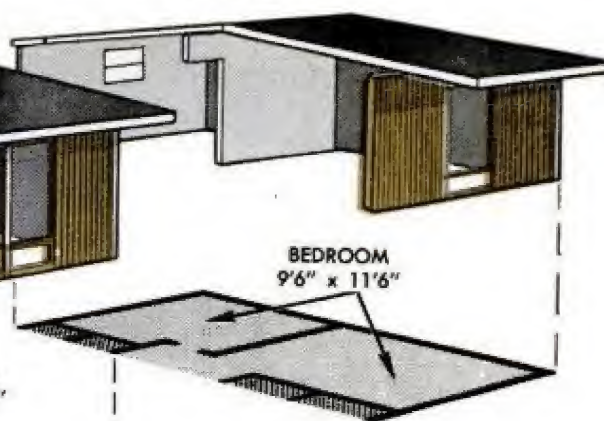
STUB TIE-INS are laid at corners of basic foundation when future addition is planned

FOUNDATION GOES FASTER when several concrete blocks are buttered at same time

STAGE 1



STAGE 2



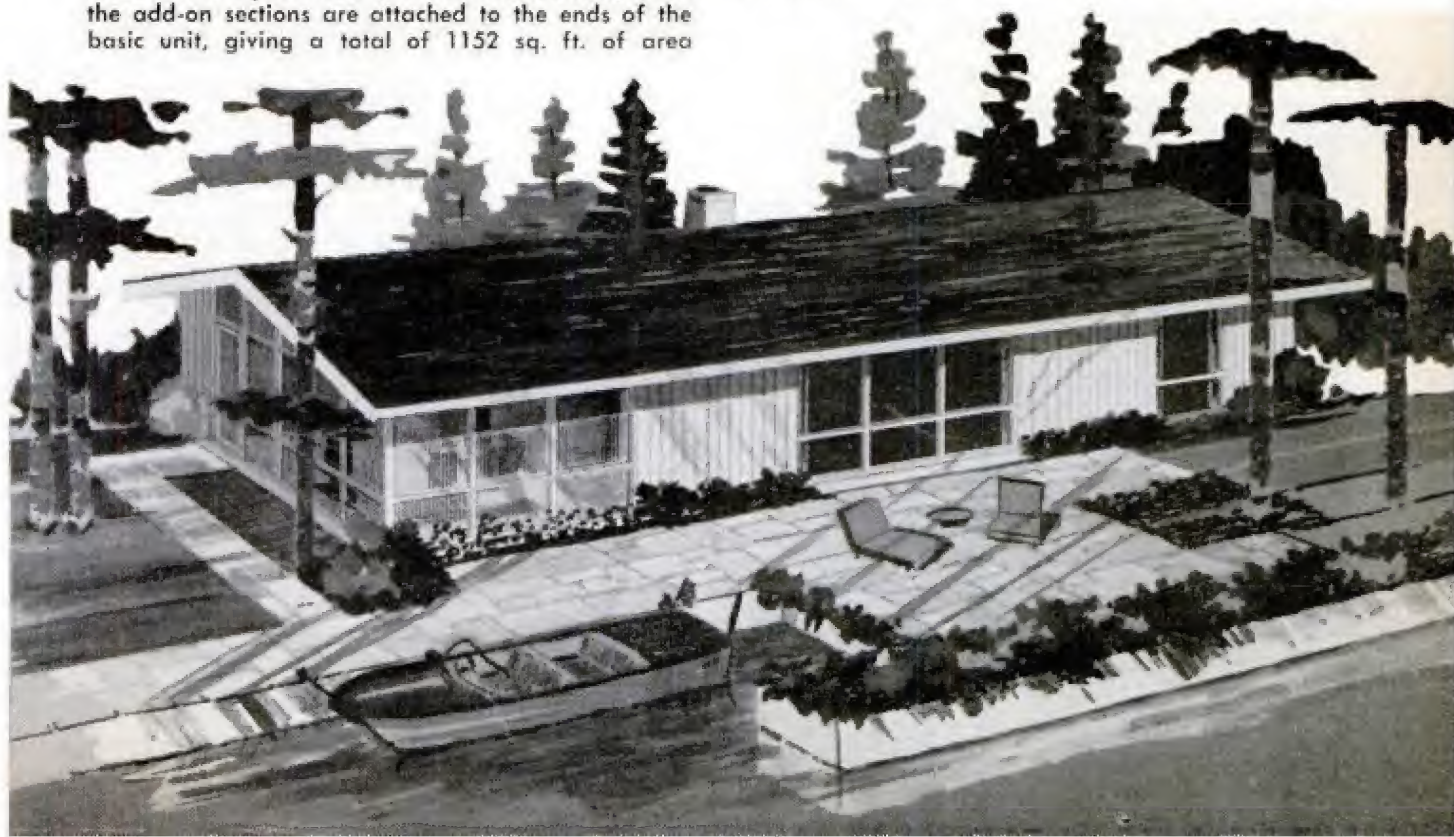
add-on affair, the modest basic unit has a modular floor plan measuring 24 x 24 ft., or a total of 576 sq. ft. It features a living room, a kitchen, a bedroom and bath, large enough to sleep and house a vacationing family of four. While the basic unit alone may very well fill your needs, both family-wise and budgetwise, the house is designed so it may be expanded at any future time with a minimum of work and expense. For example, if you find you need more sleeping area than the basic unit provides, a 12-ft. two-bedroom addition can be added. This involves little more than hitching on more 4-ft. prefabbed floor, wall and roof sections to the basic unit and cutting a doorway through the existing end wall. If

HERE'S WHAT your vacation home will look like when the add-on sections are attached to the ends of the basic unit, giving a total of 1152 sq. ft. of area

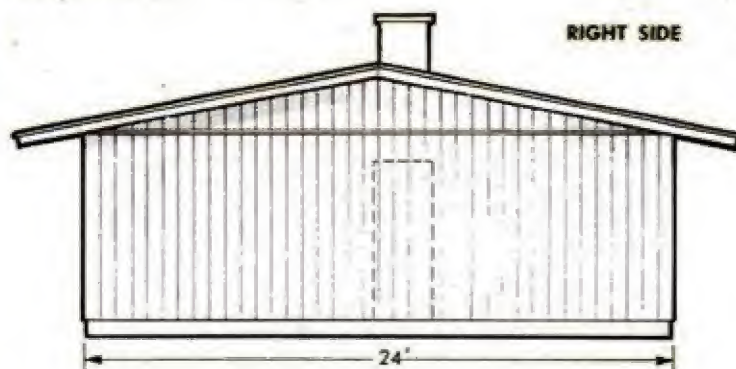
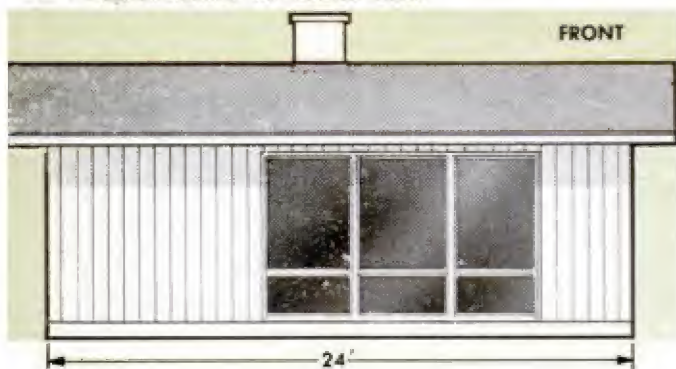
IF YOU WOULD LIKE TO KNOW

what the material cost will be to build this economy vacation home in your locality, the name and address of the lumber and building-supply dealer nearest you is listed on page 244. He is prepared to provide you with costs and further information on building the PM vacation home.

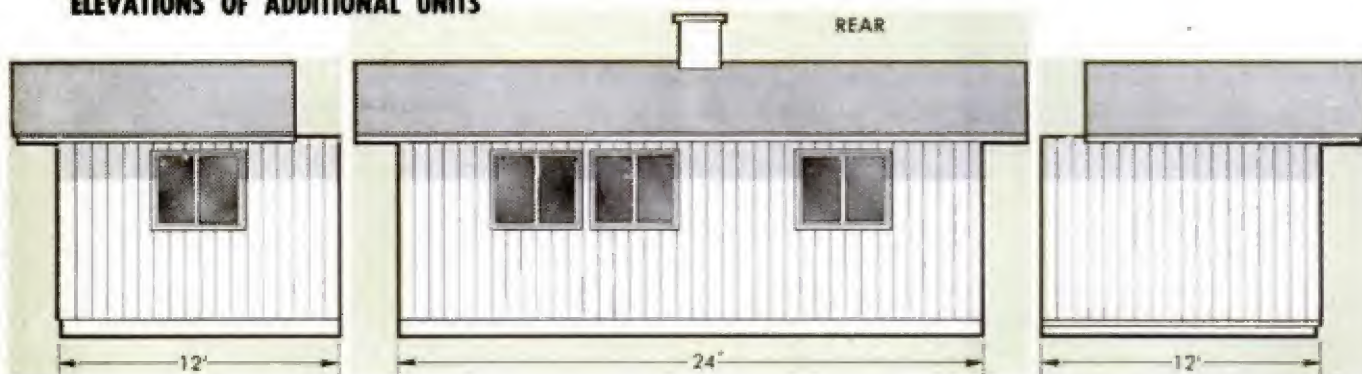
in time you feel a need for a porch and the storage it provides, here again it's a case of simply hooking on another 12-ft. addition to the opposite end of the basic unit, over the existing patio slab. In each case, the wall and roof line is not disturbed, only a few roof shingles would have to be removed to tie in with the new, plus the fascia boards on the gable ends. The third stage gives you a total floor area of 1152 sq.



ELEVATIONS OF BASIC UNIT



ELEVATIONS OF ADDITIONAL UNITS

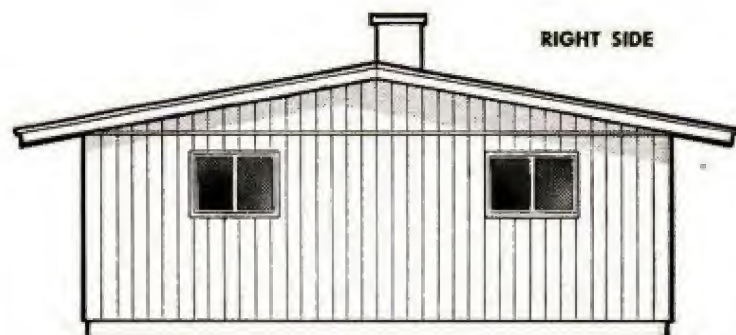
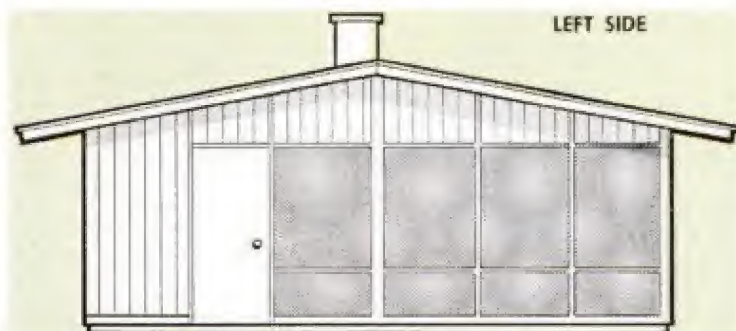
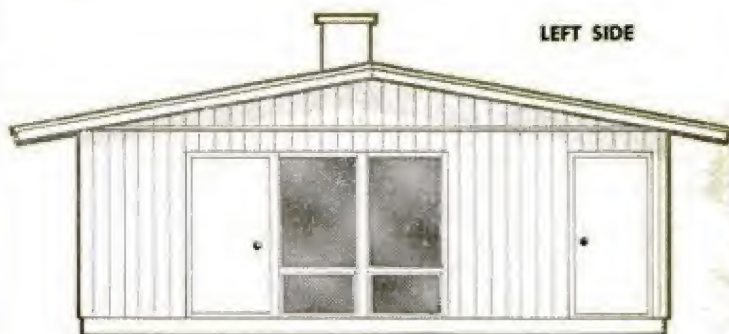
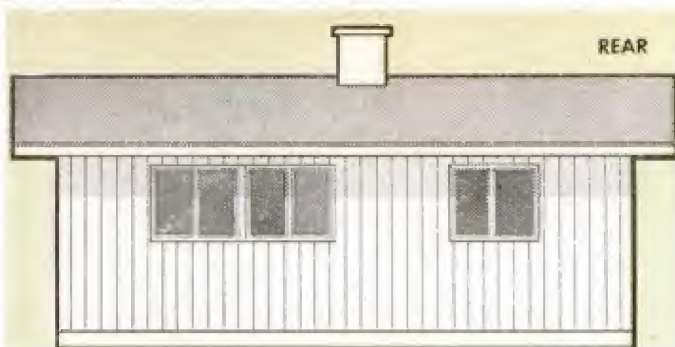


HOLES IN WALL PLATES are located for anchor bolts in foundation by placing 2 x 8 members against bolts and using try square to mark position of the bolts



ft., sufficient for even year-round living.

Now, can you actually build this home yourself? In the strict sense, no. Working alone you'll have the problem of lifting the heavy and bulky prefabricated panels. This will be less of a problem at home where friend wife can give you a hand in wrestling with the panels. However, when it comes to erecting them and framing the roof, you'll need a helping hand. There's the problem, too, of a well, a septic system and of getting the crawl space bulldozed. Actually, it makes sense to have the footing and block foundation laid for you so that when you are ready to take over, this part of construction is already done. In the case of the foundation it might be well to weigh the future possibility of building stage II. If so, you will be ahead to have the footing for the bedroom addition laid at



COMPLETE PLANS

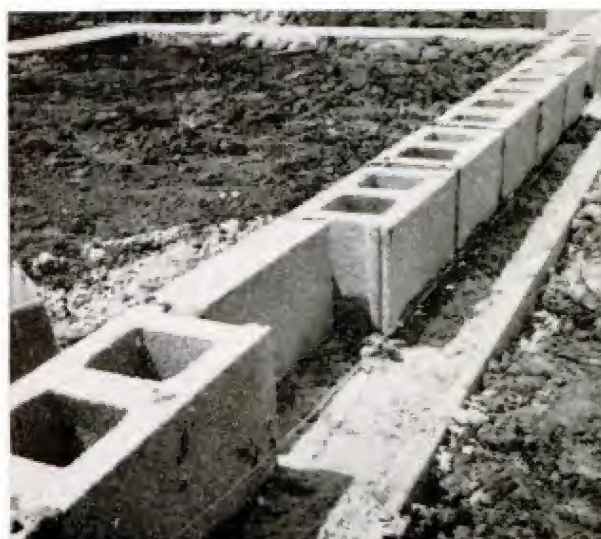
including a material list, are available for the PM Vacation Home. Each set contains 14 sheets which detail the basic home as well as the add-on units. Floor alternates are included for the builder who may wish to follow conventional joist construction rather than pre-fabricating sections. The cost of the plans is \$20.00 for one set, \$35.00 for four sets. Each additional set is \$5.00 when ordered with the initial set. Order from Plans Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois.

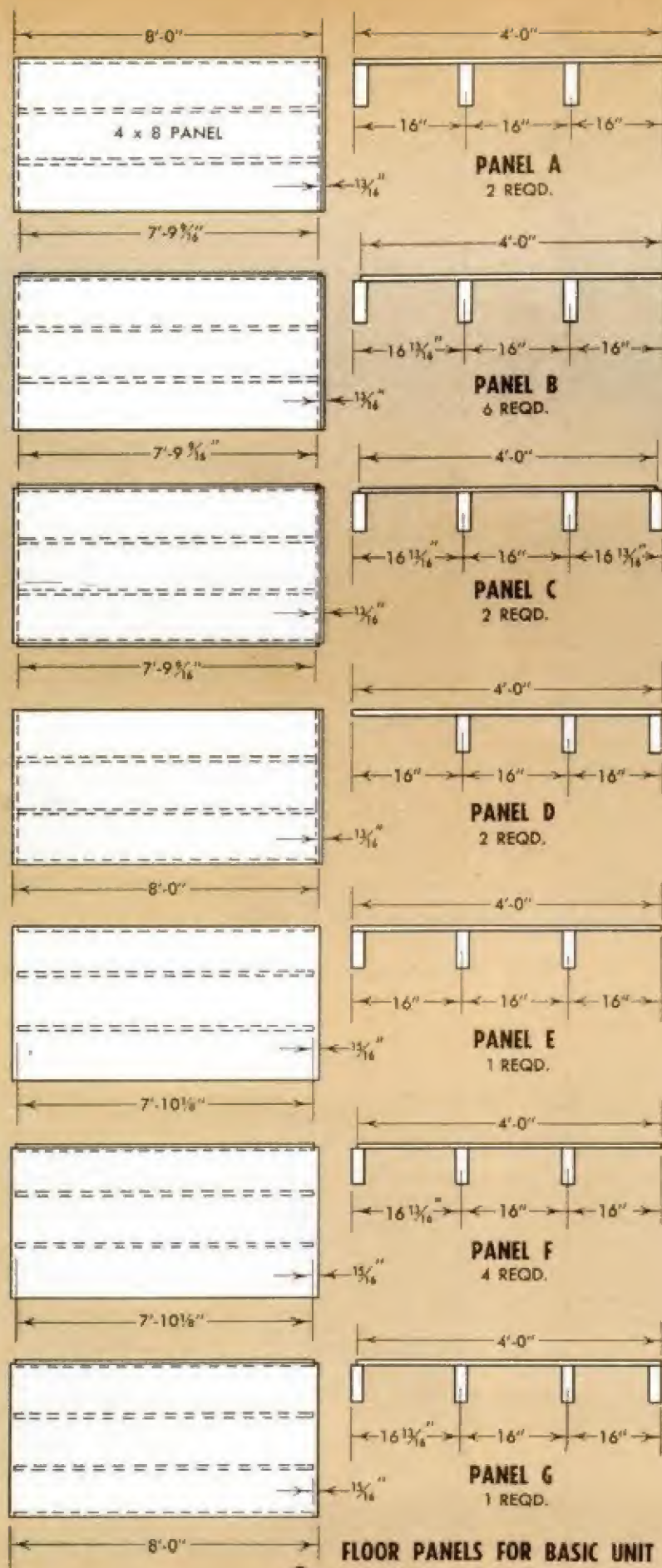
the same time as the footing for the basic unit and to have a portion of the foundation wall extended. Such long-range planning not only will save you money but will also provide foundation stubs for tying-in the new wall. Both footing and stub walls can be graded over and uncovered later.

What will the house cost? Materials for the basic unit will run about \$3000.00. This figure is based on material costs in a high-cost area and could very well be less in your particular locality. To this you will have to add the cost of the lot, the cost of a well, septic system and whatever additional labor you will have to hire.

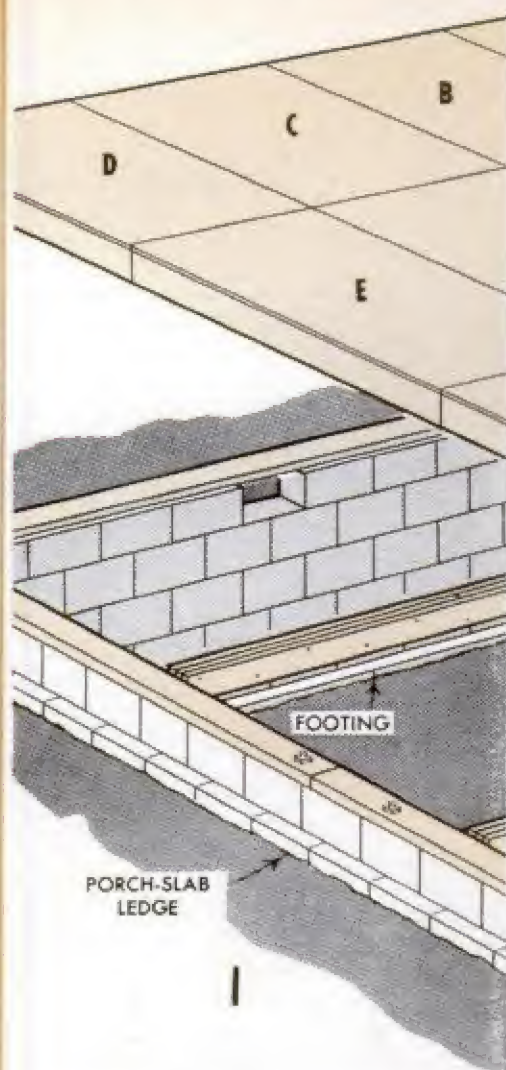
Construction procedure is to be presented in a series of four articles, dealing with the building of the basic unit only. Since you will need several sets of regular builders' plans, which is customary, not

EACH PILASTER in the foundation wall of the basic unit is built up with a 4-in. block backed with a common 8-in. block in each course of the wall



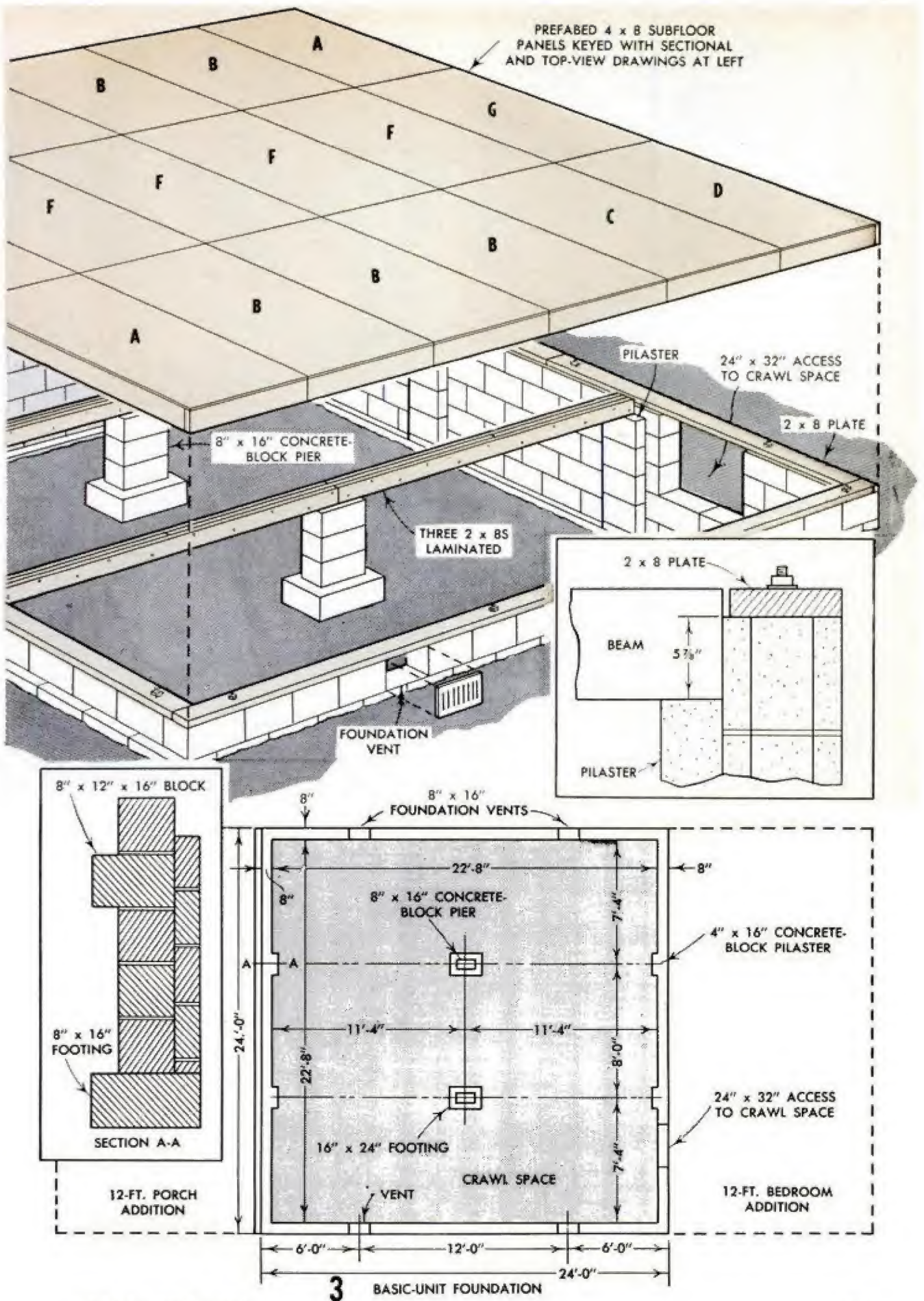


2



only to follow in building the home but for obtaining a building permit, finance loan, etc., the details in the magazine article serve only to acquaint you with the general construction. The builders' plans are presented in much greater detail and cover construction of the basic as well as the add-on units. In addition to a complete material list, the plans give the builder a choice between a prefabricated floor, a conventional joist floor and a concrete slab.

What tools will it take? The perfect power tool for mass-cutting duplicate members to the exact same length is a radial-arm saw. But it doesn't mean you have to own





RADIAL-ARM SAW makes play of cutting duplicate floor members squarely and to exact same length



STOP BLOCKS automatically position longitudinal members in nailing jig in fast assembly-line operation



UPRIGHT STOPS ON JIG quickly position closure members for nailing to ends of longitudinal members



SHEETING ON SOME floor units center on edges of 2 x 6s to provide nailing ledges for adjacent units

such a saw. In fact, if you've got what it takes, musclewise, to whip through 2-in. lumber with a handsaw, you can build this home with a minimum of common carpenter's hand tools. On the other hand, if you're not so good at hand sawing, it will pay you to invest in, or rent at least a portable electric saw. It is important that the members be cut squarely, so the prefabricated sections will fit together accurately.

Now to go to work. Prefabbing the floor is your first step. Based on a module of 4 ft., the floor of the 24 x 24-ft. basic unit requires eighteen 4 x 8-ft. sections. In studying Figs. 1 and 2 you'll notice they are not all alike, although several of the group are made in duplicate. For example, 6 of (B) are made alike, 4 of (F), 2 of (A) etc. All require 4 x 8-ft. panels of $\frac{3}{8}$ -in. material which are nailed to a framework of 2 x 6s placed on edge. Here, even though a couple of the sections require only one

of a kind to be fabricated, you'll find it will pay to take the time to make a nailing jig. Rigged up on a couple of horses and fitted with stop blocks to position duplicate parts uniformly, such a jig will make the work go faster in an assembly-line manner. Some of the assemblies are left open at the ends, others are closed at one or both ends. In some cases the 4 x 8-ft. sheets are kept flush with the 2 x 6 members, in other cases the sheets are centered on the 2 x 6s to provide nailing ledges for the adjoining sections. Use 8d coated nails spaced 6 in. apart to fasten the $\frac{3}{8}$ -in. material, 16d nails to nail the 2 x 6s. As each section is completed, letter it so you will know the order in which it joins the others. If you lack the space to store the completed sections indoors, stockpile them outside on a level surface and cover with a protective tarp.

Figs. 2 and 3 will give you an idea of how

(Continued to page 254)

POPULAR MECHANICS

**OWNERS
REPORT**

A NATIONWIDE SURVEY

**Based On 603,902
Owner-Driven Miles**



OWNERS FAVOR FRONT END over rear—due to grille and sloping hood—but tend to approve over-all styling

Smaller Plymouth Wins Greater Owner Approval

Marginal and boldface comments by Jim Whipple, PM's Auto Editor

There has been a lot of tightening up on quality control at Chrysler, since the publication of PM's last Plymouth Owners Report, on the 1960 model. Like the current model, the 1960 car was brand-new—Chrysler's first year with a unit construction body and slant Six engine.

Owners rated that 1960 Plymouth 50.9 percent Excellent, 38.2 percent Average and 10.9 percent Poor. Twenty percent of

all the owners reporting then complained of poor workmanship.

In contrast, owners of the new 1962 Plymouth rate the car 66.6 percent Excellent, 28 percent Good, 3.1 percent Fair and 1.9 percent Poor. And complaints of poor workmanship have dropped to 8.8 percent.

The real payoff comes when we compare the owners' desire to buy another Plymouth. Of all 1960 owners reporting, only

OWNERS LIKE . . .

Sure, easy handling
Soft yet steady ride
Lively performance

OWNERS DISLIKE . . .

Poorly finished details
Scant legroom, headroom
Air leaks at windows

For the 1962 Owners Reports, PM's rating system has been expanded from Excellent, Average and Poor to Excellent, Good, Fair and Poor. This new four-category breakdown is intended to provide a more accurate reflection of owner's opinions of their cars.

Weight reduction on the '62 has made steering even easier than on previous models—and that's without power. →

33.5 percent said they would buy one again. But this year, a solid 85.3 percent say that they want another Plymouth.

Obviously, Plymouth production engineers, who knew the problems (and their solutions) in 1960, are really getting results in improved quality of product today.

If our sample of 1962 Plymouth owners is as representative as we think it is, over 71 percent of the buyers of new Plymouths are getting V8s, and over 28 percent are buying Sixes.

To back up this report, PM tested a '62 Plymouth Belvedere Six sedan with automatic transmission. Constant-speed fuel mileage readings were taken, with the following results:

27.7 miles per gallon at 30 m.p.h.

25.5 miles per gallon at 40 m.p.h.

22.8 miles per gallon at 50 m.p.h.

21.8 miles per gallon at 60 m.p.h.

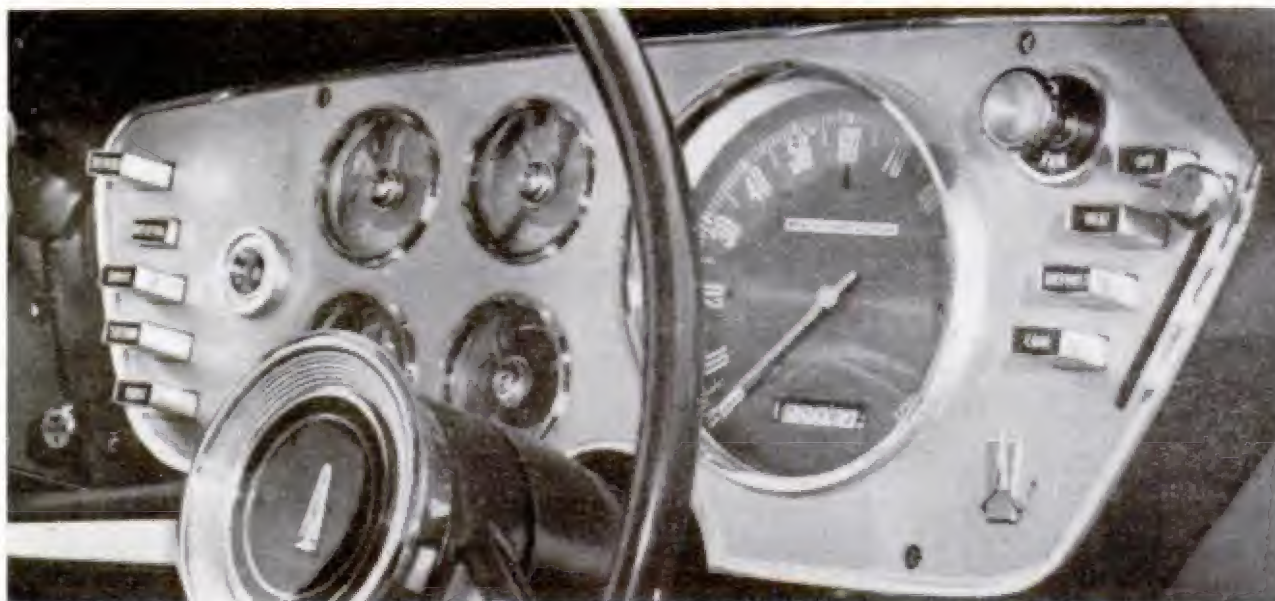
18.7 miles per gallon at 70 m.p.h.

Over-all fuel mileage obtained, including warmup, acceleration and driving on country roads and in city traffic, was 20.6 m.p.g.

To get down to cases, here in order of their frequency of mention are owner statements on the six best-liked features of the '62 Plymouth.

"We like the wonderful way the car handles in traffic."—Nebraska bank teller.

"It handles like a small car, has a quiet ride and no rattles—after 7000 miles."—Maryland cab driver.

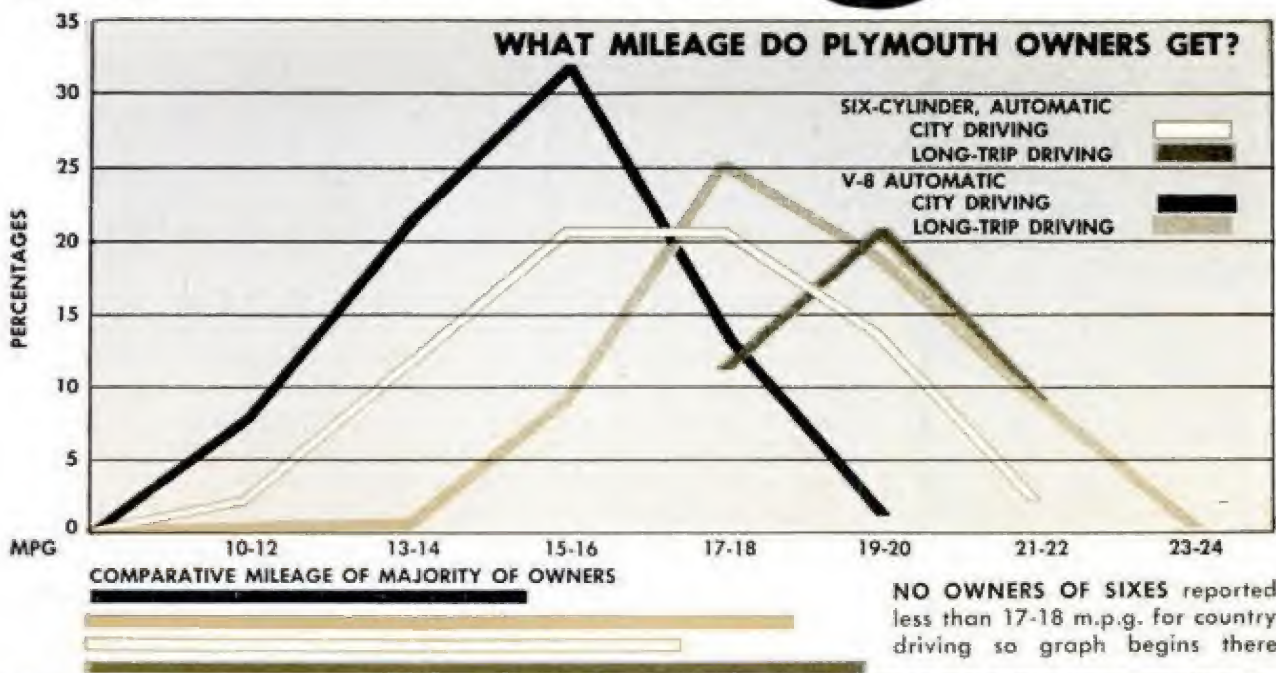


OWNERS LIKE HUGE, easily-read speedometer just below eye level, and well-lighted, sensibly-grouped controls and gauges. Below, curbside comparison shows roomy new Plymouth is smaller than other late models





DOOR FRAME CORNERS can scratch, snag clothes, some owners said. Right, rear door has full exit room but sill is high





PLYMOUTH'S TRUNK holds nine bags plus flat-mounted spare, but you must lift them high to clear the rim



LOWER TUNNEL shows real efforts to cut it down in '62; owners' beefs are fewer than on '60 Plymouth

His enthusiasm is understandable. Plymouth's excellent ride is becoming a tradition. →

Plymouth's standard, 318-cubic-inch V8 option comes with low numerical rear axle ratio, efficient automatic transmission. His mileage is common on long trips. →

PM's test Six with its efficient, three-speed automatic accelerated as well as Fairlane V8. →

We agree. Many people don't like the '62 Plymouth right off the bat because of its different styling approach. →

He may have to switch to premium fuel when he gets a little carbon in that engine! →

It's not hard to mistake Plymouth's low-effort steering for power on six-cylinder models. →

"I like the ease with which it handles and parks; I can almost turn on a dime."—Minnesota retiree.

"I had a compact previously, and in comparison the Plymouth rides like a Cadillac."—Maryland salesman.

"Rides every bit as well as our '60 Chrysler Windsor."—Utah engineer.

"The powerful V8 with automatic transmission gives surprising gas mileage—19 m.p.g. over-all."—Alabama salesman.

"I've got plenty of power and get good gas mileage (V8)."—Texas farmer.

"Plenty of power for a six-cylinder car."—New York retiree.

"The six-cylinder engine has plenty of pep. I'm most satisfied with the power of this car."—Ohio press operator.

"It's amazing how much the performance has been improved compared to my '60, and my '62 averages about two more miles per gallon."—Nebraska county commissioner.

"Performance far exceeds any similar '62 car of the same horsepower."—South Carolina theater owner.

"Frankly, I wasn't too impressed with Plymouth's styling this year, but I find it a functional design—one that grows on a person after a time."—New York accountant.

"The lines are clean cut and there's just enough trim."—Florida retiree.

"Our 20 m.p.g. was over mountain roads, about 100 miles in 2nd gear in a snow storm—a real blizzard!"—Wyoming rancher.

"I can use regular gasoline in my 270-hp. V8 without loss of power."—Pennsylvania camp director.

"Steering qualities are excellent. The car doesn't seem to fall away on curves."—Pennsylvania millwright.

"It steers easier (manual steering) than my last one and its wonderful to drive on the highway."—Minnesota salesman.

"A bonus surprise to me was the ease with which I can maneuver the car in tight situations (no power steering)."—Nebraska musician.

As usual, there are complaints, too. Let's examine them, numbers one through five in order of frequency of mention.



BULKHEAD WIRING CONNECTOR—a good idea, but PM test car's horn wire and starter lead each loosened



STEERING WHEEL POSITION pleases owners. Front seat is roomy for all, including longest-legged drivers

"The body seems slapped together."—Virginia heavy-equipment operator.

"The factory didn't finish the inside. It was a very messy job."—Iowa farmer.

"Door handles fall off; radio grille falls off; chrome trim comes loose—poor inspection at factory."—Texas dairyman.

"The finish had bubbles and knots around the whole car and the factory representative authorized repainting of the

(Continued to page 246)

Here's that old bugaboo quality control again.

← *A car may operate perfectly, but what a disappointment to the owner if it looks sloppy.*

SUMMARY OF OWNERS REPORT:

EXCELLENT
66.6%

GOOD
28.4%

FAIR
3.1%

POOR
1.9%

Satisfied with automatic economy?
About as expected.....44.9%
Better.....43.7
Not as good.....11.4

Satisfied with manual economy?
About as expected.....56.5
Better.....39.7
Not as good.....3.8

Best-liked features
Handling ease.....53.4
Riding comfort.....37.5
Power performance.....31.6
Styling.....14.1
Economy.....12.8
Steers easily.....9.7
Size, compactness.....9.4
Roadability.....7.5
Brakes.....5.9
Solid, rattle-free.....5.9

Most frequent complaints
Poor workmanship.....8.8
Lack of leg, headroom.....5.3
Windows.....4.1
Doors.....4.1
Glove compartment.....3.8
Water leaks.....3.4

Had mechanical trouble?
No trouble.....78.7
Some trouble.....19.1
Considerable trouble.....2.2

What was trouble?
Automatic transmission.....3.1
Alternator.....2.5
Water pump.....2.2

Best-liked exterior features
Hood.....13.4%
Front end.....12.2
Grille.....11.9
Absence of fins, gingerbread.....5.0
Low, streamlined styling.....5.0
Simplicity, Continental look.....3.1
Smaller size.....2.8
Paint job.....2.8
Colors.....2.5

Least-liked exterior features
Rear end.....12.2
Rear window.....5.3
Hood.....4.4
Trunk.....3.8
Taillights.....3.1

Best-liked interior features
Dashboard, instrument panel.....36.3
Seats.....14.1
Upholstery.....12.2
Roominess, head and legroom.....8.4
Small transmission hump.....3.1
Heater, heater controls.....3.1

Least-liked interior features
Glove compartment.....10.9
Lack of room, roof too low.....7.5

Did consider another car in Plymouth's price range?
Plymouth's price range.....50.0
Chevrolet.....41.8
Ford.....34.4
Dodge.....10.0
Rambler.....4.4
Ford Motor compacts.....1.8
GM compacts.....3.2
Chrysler Corp. compacts.....1.8

Is Plymouth only car in family?
Yes, it is.....62.5%
No, it is not.....37.5

Make of other car?
Plymouth.....13.4
Other Chrysler Corp. make.....11.6
Chevrolet.....3.4
Other GM make.....4.1
Ford.....5.3
Other Ford Motor make.....0.9
Other U.S. make.....2.5

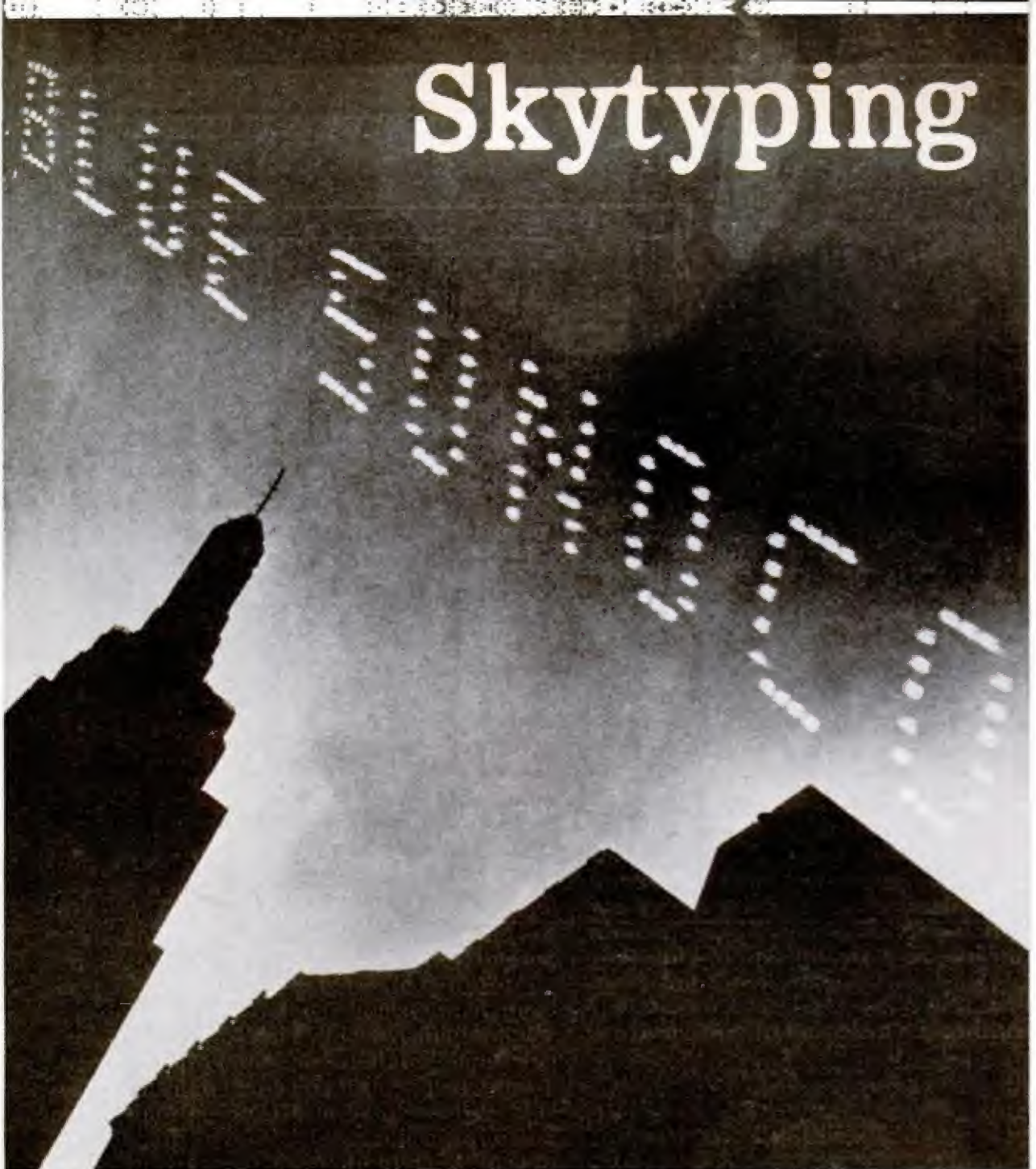
Decision to buy Plymouth based on:
Performance.....68.1
Economy.....43.8
Style.....40.0
Size.....32.8

How is dealer service?
Excellent.....68.2
Average.....26.0
Poor.....5.8

Make of car traded in:
Plymouth.....55.0
Other Chrysler Corp. make.....13.7
Ford.....8.4
Other Ford Motor make.....1.6
Chevrolet.....5.3
Other GM make.....4.0
Other U.S. make.....1.2
Foreign make.....0.9

Would buy another Plymouth?
Yes, would buy.....85.3
No, would not buy.....5.3
Undecided, don't know.....9.4

Skytyping



SEVEN-PLANE FORMATION now "types" message formerly sky "written" by a one-man, one-plane artist

AS AUTOMATION came clicking onto the scene, few industries escaped the revolution. Skywriting, a familiar sight to most Americans, was no exception. The lazy, cotton-white messages of years ago quickly became a series of puffs—orderly lines of tiny, man-made clouds that create words in a fraction of the time it took to do the same job in "longhand."

The new method? Skytyping! The technique has gained acceptance as the number of capable skywriters diminishes. At last count, there were only about six of these pioneers of "the lazy loop" still practicing their skillful art.

With the need for speed (when a sky-typed message is completed, the first word

is still legible) and more efficient methods increasing, skytyping has come into its own.

Skytyping is actually a simple idea. Five airplanes take up their positions wing-tip. First, of course, they must locate a smooth, draftless area if the message is to stay in position for any amount of time.

Then, they move out in a straight line. The center plane carries a radio transmitter which automatically operates the smoke valves in all five planes. In this way, the puffs can be released according to a predetermined plan as the five-plane group moves across the sky.

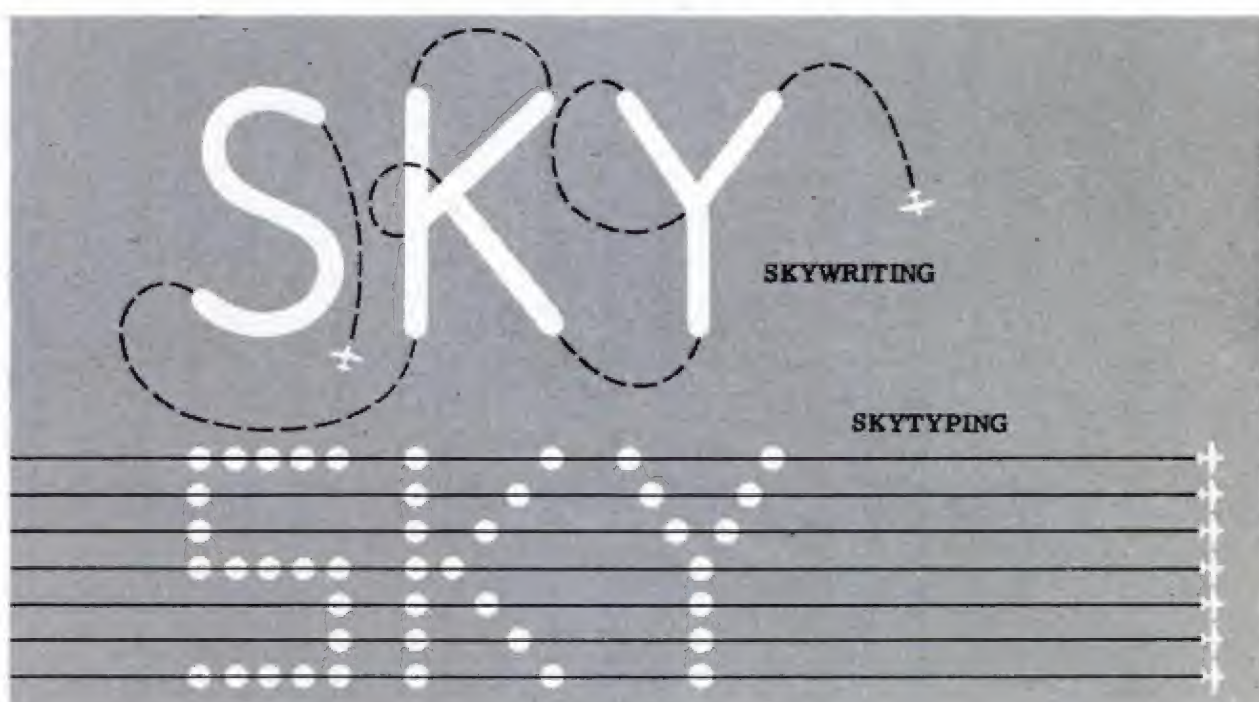
While these puffs appear tiny from the ground, each one is several hundred feet in diameter. No rolling, looping movements



SKY SMOKE is discharged from specially designed tube mounted along fuselage of each plane in group



JOB "STRIP," mounted vertically in lead-plane cockpit, corresponds to pattern flown by formation



DIFFERENT TECHNIQUES are shown in diagram. Skywriting involves precision turns, takes much longer

are necessary as was the case in skywriting. Thus, the message is quickly "typed" across the sky. It remains intact much longer than the longhand messages did even in a slightly windy sky.

Skytyping can cost as little as \$400 for a small word of uncomplicated design and as high as \$3500 for a skytyping assignment involving the five planes. Companies such as Chrysler, Ford, Oldsmobile, Sunoco and Pepsi-Cola are customers for this unusual advertising medium. Generally, it is used to introduce a new product or service because of the large number of people who can be reached with the message in a short period of time.

Reservists, retired pilots and regular

pilots with extra time make up the precision crews that type messages.

In skytyping, as in skywriting, the same chemical formula is used to produce the smoke. A carefully prepared oil is combined with a paraffin wax and placed under pressure in tanks aboard the planes. On command from the pilot, the mixture is released across the plane's exhaust pipes and, on contact with the red hot metal, bursts into a fluffy white smoke.

With millions of people inhabiting the ground below—a ready audience for the skytyped message—and the technique of skytyping firmly established, Americans can look forward to new innovations in the skies above.—Robert A. Kelly

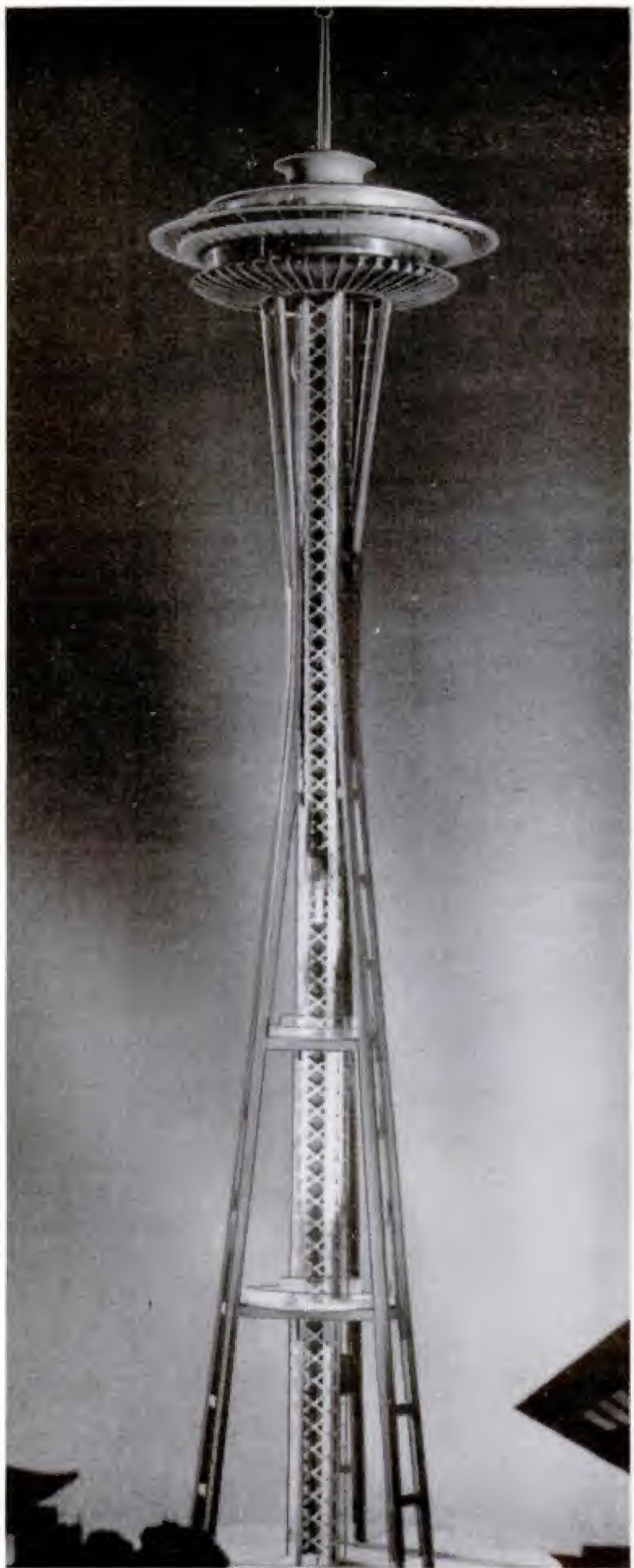
Space-Age World's Fair

By Thomas E. Stimson

THERE'S A SPECIAL BONUS for tourists this year in the Pacific Northwest. In addition to national parks, mammoth dams and snow-capped mountains, Seattle is holding America's first World's Fair in 23 years. It is called the first "space-age World's Fair" and will run from April 21 through October 21, 1962. Its theme: Civilization in the years ahead. Its name: Century 21 Exposition. It will be located only a mile from downtown Seattle. Visitors can walk or, if they are in a hurry, board an overhead monorail train that gets them there in 95 seconds.

Towering over the exposition grounds is a steel and glass "Space Needle" 600 feet tall, with an observation deck and the Eye-of-the-Needle Restaurant, seating more than 200 people, at its top. The entire top of the needle rotates one turn every hour. Without moving from their seats, diners will be able to overlook much of Puget Sound, then view Seattle with Mt. Rainier in the background and, as the restaurant continues to turn, look toward the Cascade Mountains to the east and north. High-speed glass-walled elevators will whisk visitors to the top of the needle and back again. (It is rumored in Seattle that a second restaurant, called the "Chicken-Out Inn," will be built at the base of the skyscraping tower.)

In the exhibition halls, visitors will preview a thousand wonders that science and industry foresee for the future. There will be a working model of a home computer that can plan your meals, remind you of dental appointments and other engagements and do many other mental chores. One exhibit will feature an electronic lawn mower that guides itself untended over your lawn, another



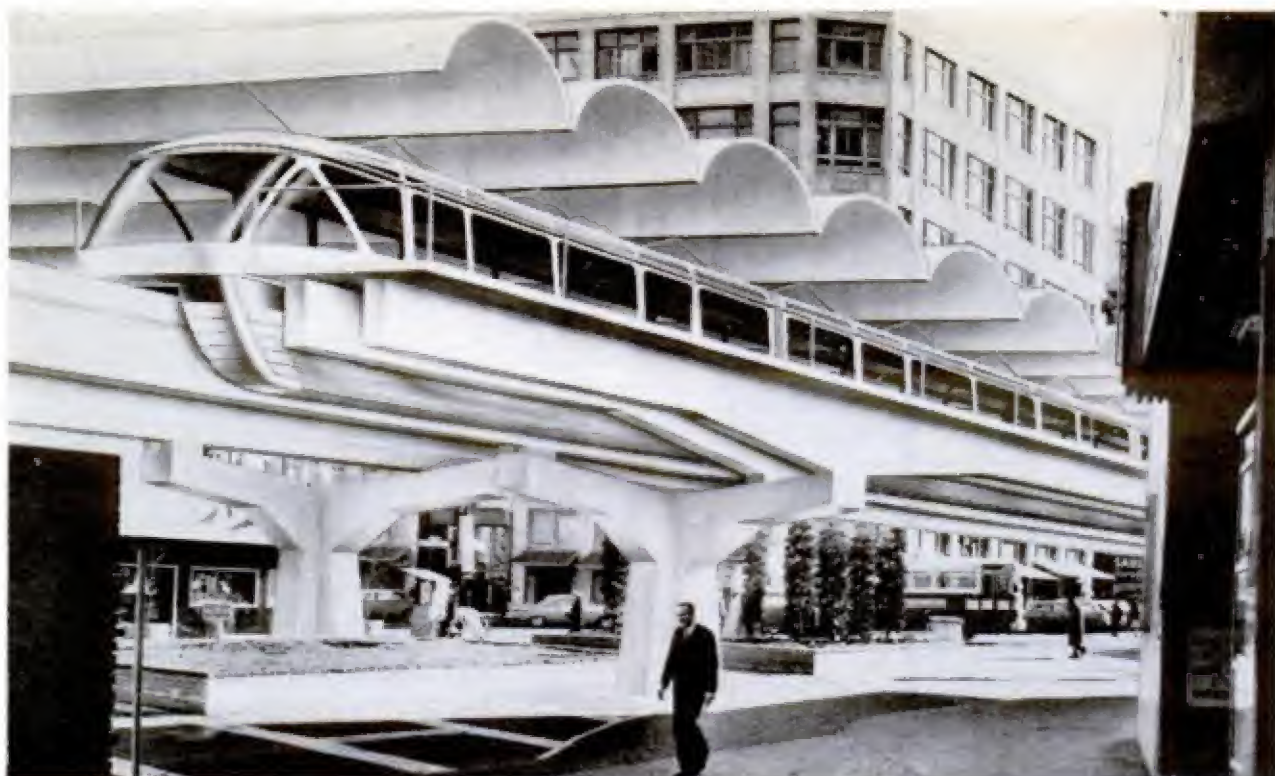
STRUCTURAL SYMBOL of the Century 21 Exposition will be the 600-foot "Space Needle," with a restaurant and observation deck on its rotating crown. Served by two 800-foot-per-second elevators—or two 832-step stairways if you prefer to walk, the tower will also house the world's largest carillon

800-feet-per-minute

(see APRIL 1962, p. 8)



VIEW FROM THE NEEDLE, above, covering Seattle, Puget Sound and the surrounding mountains, will be a major attraction. Below, an architect's rendering of the site, looking southeastward toward Seattle. Numbered attractions are: (1) Fine Arts Area, (2) Stadium, (3) Space Needle, (4) Monorail Terminal, (5) Food Circus, and (6) Federal Science Pavilion. After the fair, 90 percent of the buildings will remain to form one of the nation's largest civic centers, with facilities for huge conventions, major sporting events, and public attractions



NATION'S FIRST commercial high-speed monorail system will go from downtown Seattle to the exposition grounds, 1.2 miles in 95 seconds. It will serve as an example of the coming thing in public transportation

will specialize in cordless home appliances, a third will show an experimental automobile designed to operate on electric-lane-controlled highways. There will be home telephones that close your windows, water your lawn and turn on your oven on remote-dialed command. There will be

video phones, and phones that remember often-called numbers and dial them automatically when you press one or two buttons. Cordless telephones will be on display, as will others that transmit information at the rate of 3000 words per minute.

(Continued to page 216)

CONCRETE MUSHROOMS, cast together to form a multiple hyperbolic paraboloid roof, form sheltered walkways in the International Exhibit Area. Workman standing on truck roof gives an idea of their impressive height





By Jim Whipple



Cool First Reaction to Family-Size Cars. Compacts Flunk Chicago Police Trial

First rumble of public reaction to the new-sized autos—PM calls them “family-sized”—with 115-116-inch wheelbase, comes from two sources: **Dodge** and **Plymouth**. (Due to late on-sale dates there hasn't been much recorded reaction on **Ford Fairlane** and the new **Mercury Meteor** as we go to press.)

There have been reports from Dodge dealers who say that the new '62 products of 202-inch over-all length have received a cool reception from the public because the car is “too small.”

Also, in PM's **Owners Report** on the '62 **Plymouth** (page 95) there were a lot of traders of large '58, '59 or '60 **Plymouths** who generally liked their smaller-sized cars, but wished they were “a little longer.”

What we may have here is a case of early-season buyers who are loyal “repeaters” on a given make and are a bit startled by the sudden decrease in size. Remember that when cars grew to their present “full size” from the “old” size (116-inch wheelbase, 200-inch over-all length), the growth was gradual, from 1955 to 1960.

But, when the automakers planned today's “new” sizes back in '58 there was nothing but hue and cry throughout the land against the bigness of the “insolent chariots.” So automakers pushed their well-worn panic buttons and, after two or three years' lead time, out came these four intermediate, family-sized cars.

Wouldn't it be ironic if the public had already divided itself into two camps, compact devotees and “full-sized car” fans, and the very practical-sized **Fairlane**, **Plymouth**, **Dodge** and **Meteor** missed the boat? It's too early in the model year to raise more than a wetted finger so we won't stick our editorial neck out just yet.

A vote for big cars comes from the Chicago Police Department after a six month trial of 125 compacts for patrol duty. George Rupprecht, CPD's director of automotive maintenance, said that men on patrol for eight hours in the compacts had to slouch, could not wear their hats and complained of backaches and cramped muscles.

He also said that the compacts were ineffective for pursuit because, “they do not

hold the road well at high speeds.” Tests were a fair sampling involving **Rambler**s, **Larks**, **Valiants**, and **Falcons**.

But we can leave the compacts on an upbeat. Even though compacts were turned down by Chicago's finest, we can expect to see wider use of compacts in the car-rental industry according to a top executive of **Avis Rent-a-Car System**. Right now compacts make up about 20 percent of rental fleets.

Most of the agony involved in bringing out new models centers around the problems of eliminating bugs that weren't found on engineering test prototypes but show up in early batches of full-scale production models.

For example, prototype **Ford Fairlane** Sixes had annoying vibration stemming from drive line that drummed through the body on stick shift models. A “fix” in the form of a vibration damper was added to crankshaft pulley as production started.

Fairlane's brand-new 221-cubic-inch V8 wasn't delivering as much power at rear wheels as Ford engineers had anticipated from test runs on the dynamometer. Solution to the problem was relatively simple—larger exhaust manifolds and piping.

Sometimes mechanical innovations work out A-OK from the start, like **Rambler American**'s new oil-pressure-engaged automatic clutch, the E-Stick. According to an unusually candid source at **American Motors** their factory service people have yet to receive a complaint on this option which is being fitted to 20 percent of all **American** production at this time.

Over at **Chrysler** they've had some problems with alternators due to failure of the diodes that rectify the a.c. current output changing it to d.c. They've crash-programmed a manufacturing cure for this, so all should soon be tranquil.

Bucket-seat coupes are booming in '62 as they did in '61. Now there's a **Mercury Meteor** version called the “S-33,” numerically a notch above the **Comet S-22**. Checking **Plymouth** we find 40 percent of **Valiant** production going into their sporty-looking **Signet**, while at **Oldsmobile** the luxury bucket-seated **Starfire** is accounting for 13 percent of the product mix. ★ ★ ★



NEW CHEMICALS, sprayed from helicopter, can denude trees and reveal Red Guerrillas to the Allied soldiers



Bizarre Weapons for the Little Wars

By S. David Pursglove

HOW CAN THE United States give its little 95-pound allies in Southeast Asia more antiguerrilla firepower without weighting down the spunky but small fighters with heavy guns and ammunition?

America's answer: Fill their pockets with dozens of tiny, lightweight, rocket-powered "darts" more devastating than the heaviest .30 caliber bullet. Replace their 9-pound rifles with gun barrels the size of soda straws to use as launching tubes, and each Vietnamese or Laotian antiguerrilla fighter becomes a running, jumping, hiding, attacking missile battalion.

This is just one new weapon that Pen-

RUGGED TERRAIN of Southeast Asia (left) makes useless usual techniques and equipment of warfare

FLAME THROWER, still a good jungle weapon, is often too heavy for undersized Asian soldier to carry



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NAPALM MINES, made of gasoline and thickening powder, are buried and ignited with new fuse, spraying enemy troops with flaming liquid



TINY BOMBLETS, rained from aircraft, are deadlier than strafing

tagon scientists are developing to help our allies and our own "brushfire war" troops defeat Communist guerrillas, infiltrators and riot-inciters on their own ground. One of the dirtiest, but most effective, weapons that the Reds use against our Asian allies (nails) is now met by a new defense: A swamp tennis shoe with a steel insole.

We can spray a band of jungle around villages under frequent Communist attack with new chemicals that drop the leaves from brush and trees, robbing guerrilla raiders of foliage protection and exposing sniper nests.

Night raiders who masquerade as harmless rice farmers by day are exposed by

sprays of dyes that they cannot wash off.

New aids to better vision at night, when most guerrillas operate—are being made smaller, lighter, and simpler for guerrilla warfare.

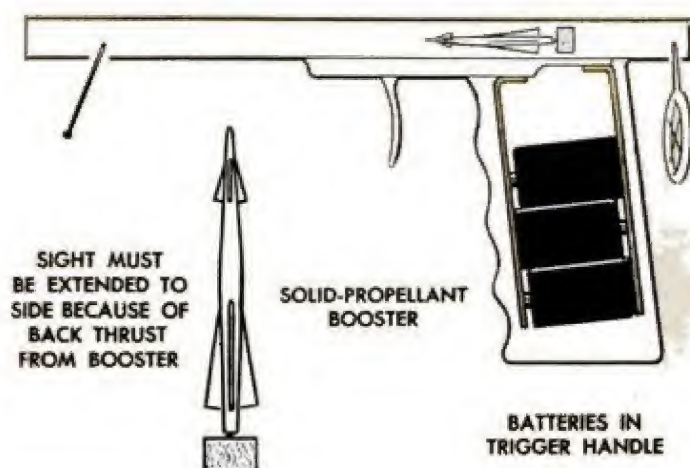
New guerrilla-fighting tactics and better ways of dealing with natives whose support we need are getting expert attention. One result may be to overturn the time-honored principle that "a guerrilla lives off the land." Our roving forces may start getting more and better-delivered air drops, leaving only the Communists to rob food from the very natives they count on for support.

Many Vietnamese and other Southeast

REMOVABLE STEEL INSERT protects Allied fighting man from guerrillas' nastiest booby-trap—a buried plank with sharpened 7-inch nails buried just under surface of jungle trails. Canvas tops resist swamp rot; leather doesn't



Bizarre Bazooka



BIZARRE HAND GUN is a miniature bazooka. It fires tiny but powerful rocket through barrel the size of soda straw



Asian troops and certain local groups elsewhere in Asia, Africa, the Middle East, and Latin America now look to U.S. military groups for advice and help. These "indigenous forces" (native troops) are the mainstay of our new determination to stop the Communist hacking away of the free world, a piece here, a bit there. They are the bulk of the force that fights the undeclared wars. And they will be the good right hands of American troops fighting the "limited wars" of the foreseeable future.

For them, the Defense Department is developing radical new weapons and is vastly improving some of the reliable stand-bys of nonnuclear war. One of the newest and most radical—the "Microjet" rocket—is a hard nylon needlelike projectile about one inch long. Nobody in the Pentagon can con-

firm details, but the microjet apparently is very much like a toy missile sometimes found as premiums in Crackerjack boxes. But somebody in the Pentagon has added to this "toy" a tiny solid-propellant rocket.

The weapon can be fired accurately from soda-straw size plastic or aluminum tubes for several hundred yards with a speed nearly twice that of a standard .30-caliber military rifle bullet. The almost noiseless projectile will penetrate thick plaster walls and small tree trunks.

Microjet definitely will be a guerrilla weapon. One fighter can discard his rifle

M-60 MACHINE GUN is handled easily by husky American, but is too awkward for 100-pound Asian



and move lightly with just the small plastic straw and a pocketful of rocket-darts. Also, a number of launching straws can be grouped together to fire a devastating barrage, still controlled by just one man.

Although many modern weapons are very sophisticated, it is still the very simple problems that cause us the most trouble. A seven-inch nail driven through a board has caused much anguish in the swamplands of Southeast Asia. Viet Cong Communist guerrillas would drive the nails through boards, sharpen and barb the points, and bury them like land mines in muddy trails.

This weapon was as effective as any anti-personnel mine and could not be detected. It explains why a Vietnamese soldier does not actually lift his bare feet when he "runs." He slides them instead, to feel for the nails. He cannot wear the leather combat boots that we tried to force on him for many years because they, and his feet in

them, would soon rot in the humid swamps.

Then about three years ago, our Army developed a light canvas shoe that would not confine water around the feet and would let them "breathe." It had a rubber sole containing a steel plate that the barbed nails could not penetrate. Thousands of the swamp tennis shoes were shipped to Vietnam from Japan where they were produced. They proved effective, but the steel plate hampered walking on hard or rocky ground where the nails cannot be used.

So now at Natick, Mass., the Army Quartermaster Corps is putting the finishing touches on a new swamp boot with a detachable plate. The steel insole can be removed for action on high ground, and can be inserted into the boot when there is danger of barbed nails.

From large atomic bombs for strategic warfare to very tiny bombs to fight guerrillas—that's the Air Force arsenal. It has



HELICOPTER DROP, without parachutes, is accomplished by sliding fully equipped soldiers down rope. In hit-and-run warfare of Southeast Asia such quick dispersal of troops becomes critical



FARMERS OR GUERRILLAS?

CHEMICAL WARFARE may end duplicity of guerrillas who pose as farmers during daylight. Sprays dropped on enemy positions during night maneuvers will leave stains on them that will identify them as Red soldiers

recently developed a "bomblet" made of cast iron, weighing only a few ounces, and just 2½ inches long. Because of its bomb shape, the small hunk of metal, called *Lazy Dog*, straightens its path and falls toward targets with tremendous speed and power.

Strafing a guerrilla camp with a 20-mm. cannon requires several passes, exposes the plane to danger, and uses a large amount of very expensive ammunition. Now tactical fighters can make a single high altitude pass, dropping thousands of cheap bomblets with an effect equal to strafing. *Lazy Dog* offers a psychological advantage,

too. Its silent killing will strike terror into an unsuspecting guerrilla band.

What has happened to make us want such unusual weapons? In recent years, America's ability to cope with brush fires—Korea, Laos, and Lebanon-type actions—has slid downhill while most of the money and effort has gone into nuclear weapons.

The communists, meanwhile, pick jungles, swamps, mountains and deserts for their battlefields, and we have not been equipped to fight there.

This problem is so serious that the Penta-

(Continued to page 236)

HOW THE RED GUERRILLA FIGHTS

The Viet Cong communist guerrilla does not have any modern weapons and equipment. However, he has the advantage of being on the offensive, picking the time and place for battle. The element of surprise is on his side. His task is much simpler—just destroy—where the Allies task is to build, protect and preserve.

The Viet Cong soldier has no uniform. He wears the dress of the native population. When about to do battle, when he must be identifiable to his own troops, he ties a colored band around his arm or fastens a sash around his waist. Only if he is fortunate does he have a firearm, then it will be almost any rifle that could be captured and for which he can scrounge some ammunition. Most of his comrades either use crossbows with poison-tipped arrows, or devote themselves to digging the effective "panji" traps. Only the elite Viet Cong forces that move into an area for the kill and consolidation after local subversives have prepared the way will be equipped with the Red Chinese grease-gun or the Russian lightweight rifle, mortars, and other equipment. They seldom

are seen since the local subversive national guard-type units usually have emptied the area of our Allies.

Panji traps, more important weapons than rifles, are camouflaged pits. Needle-sharp bamboo stalks are shoved upright in the bottoms. The sharpened points are coated with human body waste, manure, remnants of decaying animals and even a prepared culture which will produce fatal infection or tetanus. Sometimes, the Viet Cong also rig the traps with grenades.

Panji traps are not dug in paths where they would be suspected. Instead, they are dug among the best cover and shelter surrounding the area where our allies will be attacked. As the Vietnamese jumps for cover, he falls into the trap.

Viet Cong camps always are completely surrounded by panji traps. They act as sentinels. A Viet Cong unit consists of five squads and in bivouac each squad beds down 25 yards from other squads. Each squad area is protected by earthworks about 18 inches high. Beyond the small walls are the panji traps.



Steel Feet for Leathernecks

Armored boots with a six-inch "sole" of stainless steel beveled to deflect blast fragments will help protect Marines from injury by wartime land mines.

The boots, developed by a Naval research laboratory, are scheduled to be issued to the Marines this year. Prototypes were made by the International Latex Corp.

Medical records indicate that feet and lower limbs are the most common casualties from land mines. The boots were developed to protect against those injuries.

QUOTE:

"Space has great military potential. While Russia is many thousands of miles away, our satellites have made more than 50,000 orbits of the earth, some of them only 100 miles up. That's pretty close."

MAJ. GEN. LEIGHTON I. DAVIS
Commander, Air Force
Missile Test Center
Cape Canaveral, Fla.

Packaged Bathroom Comes Ready for Installation

Molded as a plastic shell with the tub integrally cast in place, a new modular bathroom—complete with framing that also serves as a shipping crate—arrives at a building site ready for installation.

Available in a choice of colors, the six-by-eight-foot unit includes a wall-hung toilet, lavatory set into a counter, shelves

and sliding mirror above the counter, electric heater and lights.

The floor, wall and ceiling shell is made of fiberglass reinforced with vibrin polyester resin. Counter tops are laminated plastic, and the floor is covered with vinyl.

It's made by Modular Components Corp., Chula Vista, Calif.





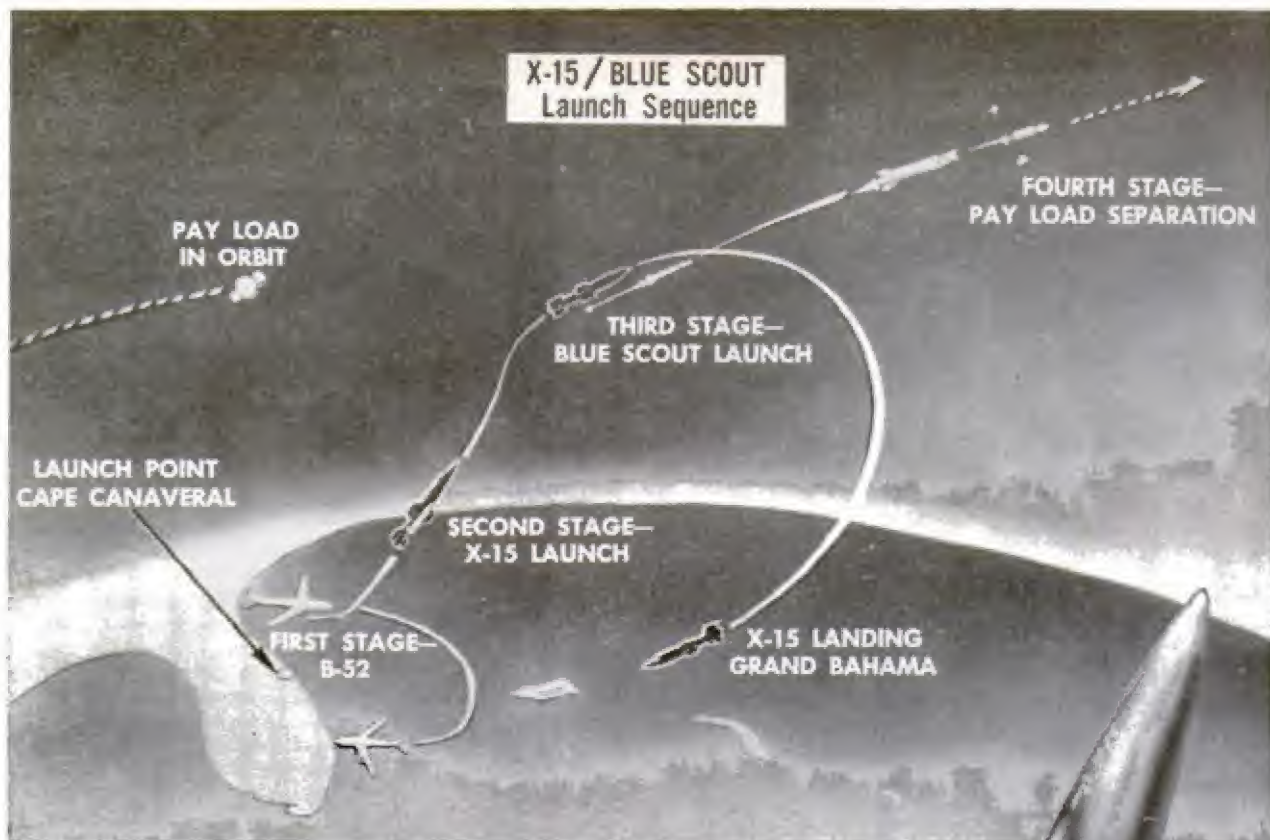
Big Brother Keeps 'Em Rolling in Detroit

Traffic along a 3.2-mile stretch of the John C. Lodge Freeway in Detroit, Mich., is watched and directed by an operator in a control center who views 15 closed-circuit TV monitors. As traffic situations develop, the operator can control use of

lanes and speeds by overhead signs on the expressway; he can also close entrance ramps.

The cameras in the experimental General Electric system can be tilted and panned, and the lenses switched for close-ups.





Piggy-Piggyback Satellite

Not one, but two manned boosters may be used to put a rocket into orbit as a satellite or send it into a deep space probe.

The system would include an Air Force B-52 bomber with an X-15 rocket airplane strapped beneath its wing. The X-15, in turn, would have a Blue Scout research rocket tucked beneath its fuselage.

In the proposed system, the B-52 will launch the X-15 at 50,000 feet and the X-15 will launch the Scout at 156,000 feet. Both the B-52 and X-15 would then return for landings, thus recovering both the first and second stages. This has not been possible with other satellites and space probes.

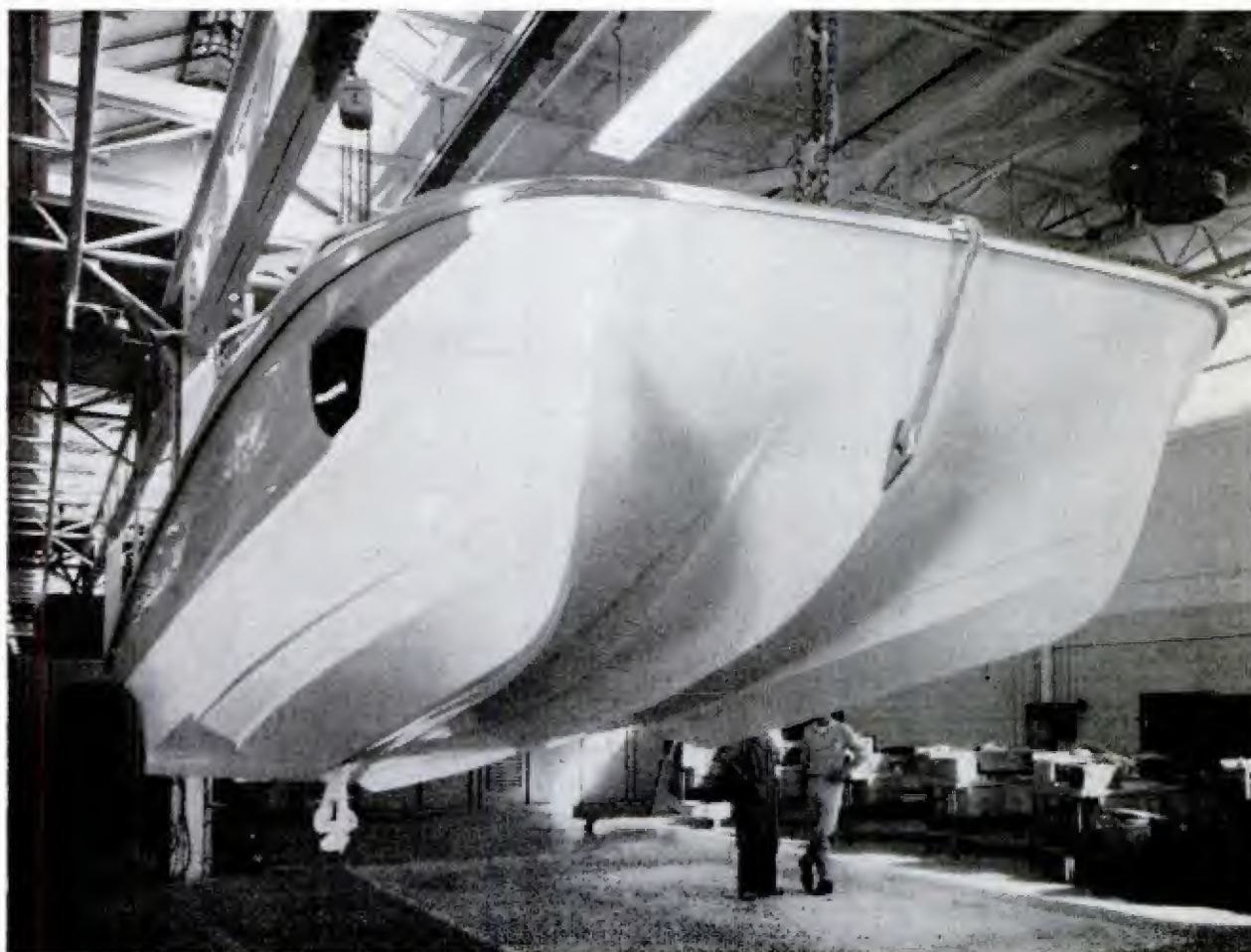




Unique Inboard Runabout Designed for Stern Drive Unit

First three-point inboard pleasure runabout, and maybe the first boat to be designed specifically for an inboard-outdrive power system, the new OMC 17 combines the Outboard Marine Corporation's V-4, 80-horsepower stern drive unit (PM, August '61) with a unique 17-foot fiberglass hull designed to provide maximum performance without sacrificing comfort or stability. The

unusual three-keeled hull employs a thin center "fin" hull between the two main hull sections, which are stepped like a racing hydroplane. The design, developed by the OMC design section, is the product of over two years' research, during which over 40 hulls were built, tested and rejected. The boat will sell, fully equipped, for about \$3500, or in a utility version, about \$2800.



There's Adventure In Your Crankcase

By Kevin V. Brown

SEISMIC CREWS who invaded the virgin mountains of northern Alberta have been chased by a mammoth race of grizzlies that was believed to be extinct as long ago as the Civil War.

Geologists in Libya send out scouts armed with mine detectors to clear a path ahead of the major party, because more than three million unexploded World War II mines are still buried beneath the sands.

Drilling crews working in northern Canada have watched their trucks, rigs and heavy equipment — even their roads — sink out of sight in a black, smelly muck called muskeg—a goo so cancerous that it has spread across a half-million square miles, devouring everything in sight.

Some oil crews climb mountains, others dive to the floor of the sea. Some work throughout the frigid winters above the Arctic circle. Some invade the steaming jungles of South America. Others tread uninhabited Middle Eastern deserts where there is no life and temperatures rise as high as 130 degrees F.

And they do it all looking for oil they might never find. But often the hard work and the dangers do pay off.

Imperial Oil Company geologists, for instance, used a helicopter to hop from peak to peak in the Canadian Rockies. Pack mules would never have made it. Then, on foot, they scrambled along the almost vertical sides of the mountains, with sheer drops below them of several thousand feet, to collect samples of rock that helped them piece together the story of a large oil basin that lies beneath the Canadian Rockies.

In Utah's wild, deserted southeastern section, near the four-state junction with Arizona, New Mexico and Colorado, seismic crews of Pan American Petroleum Corporation toured the towering Orange Cliffs and their deep, deceptive gorges, using special portable drilling and recording equipment that could be hooked to a helicopter and airlifted from one site to another. It



MINE DETECTOR moves ahead of oil party in North Africa to seek out deadly relics of World War II





LAND MINE is exploded so heavy equipment can be sent through gap and oil search can go on. In Louisiana bayous (below), gargantuan wheels of "swamp buggy" pull crews and equipment over land, water





OIL CARAVAN of air-conditioned trailers heads into torrid heat of Rub' al-Khali, Saudi Arabian desert

not only saved time, but made the whole operation possible, because there were no roads to this remote and elevated area and trucks were useless.

Meanwhile, other oilmen are heading in the opposite direction, drilling for oil on the ocean's floor. Underwater drilling requires a stationary barge that can be installed above the surface of the water, with legs reaching down to the ocean floor. A typical drilling barge may measure 200 by 100 feet, with a drilling rig at one end and a helicopter landing platform at the other. Inside might be air-conditioned quarters for 50 men, a power plant and a distillation unit for converting sea water into fresh water.

The barge, which floats, is anchored in place by lowering up to six retractable legs to the ocean floor by hydraulic jacks. When the legs reach rock bottom, the jacks continue to operate, lifting the barge clear of the water.

Pan American had to float such a barge all the way to the Persian Gulf from Galveston, Texas. A large, Dutch ocean-going tug did the towing job, and the trip, nearly half way around the world, took nearly four months. The voyage was necessary because there were no barges available in the area and the cost of building a new one (up to \$7 million) was prohibitive.

The British Petroleum Company, which

brought in two wells in the Persian Gulf, one at 5500 feet below the Gulf floor and another at 9600 feet, needed a permanent land base near its crew to supply them with food and equipment. Otherwise they would have to service them out of a port in Saudi Arabia, nearly 170 miles away.

The land nearest the drilling operations was Das Island, a mile-long strip of sand and rock inhabited only by sea birds, scorpions and turtles. Before they could set up a base, construction crews watered and rolled 4000 feet of the sand into a reasonable airstrip on which two-engine aircraft were able to land. And, until a harbor was built (by quarrying rock from the island itself and using it to make a breakwater), most of the heavy supplies were brought in by a military tank-landing craft, which was able to run right up on the beach and throw open its bow doors to unload.

All of this is in addition to the preliminary problems of locating a likely site, taking the necessary samples and making the necessary tests—at the bottom of the sea. Deep-sea divers and, more recently, skin-divers have brought new techniques to the old routine of searching for oil.

While new techniques can solve the underwater problems, new machines are needed to cope with others encountered above and on the surface. In the Louisiana bayou country, for instance, oilmen devel-



PLAINS GRIZZLIES, believed extinct, were a hazard in Canadian mountains



RUGGED OILMEN waded through inundated forest, carrying all their equipment by hand. Clothing was taped to keep out leeches

ROCK SAMPLES are chipped from the sheer face of a mountainside in Canada



ARCTIC WINTERS are best time for oil exploration. In spring and summer rivers run high and muskeg becomes too mushy to cross



HELICOPTER (left) carries crews to inaccessible areas of oil-rich mountains. Far from home, oilman (below) can still enjoy some of its finer comforts





MUSKEG BUGGY sloshes its way through shallow area of muskeg. Normal vehicles would disappear in muck

oped an outlandish-looking vehicle called a swamp buggy to carry men and equipment through that eerie area that is half water and half land and not really one or the other. The buggy has four gargantuan wheels with quilted tracks that can float through the water and grind through the mud.

Another machine was borrowed from another industry. Cities Service Company, exploring the fabulous area of oil-soaked sands along the Athabasca River in northern Alberta, found that the most efficient device for the task was a giant mining wheel built by German engineers for digging coal in the Ruhr Valley. These Athabasca oil sands, by the way, cover 30,000 square miles and contain an estimated 40 billion barrels of hydrocarbon reserves, the world's largest deposits. But the sands are at or near the surface, so ordinary oil-drilling methods do not apply. Strip-mining methods, familiar in the coal industry, are used.

The German mining machine has buckets, fastened to a huge wheel, which dig into the ground and drop their loads onto a conveyor belt. The belt transports the sand to an extraction unit, which returns the clean sand to the ground and forwards the extracted liquid hydrocarbons to a mobile refinery nearby.

While some special equipment can be

borrowed and some developed over a period of years, other equipment must be improvised. In one case Sinclair Oil Company crews produced two self-propelled landing barges for operations in Somalia, Africa, because the nearest port was 350 miles away.

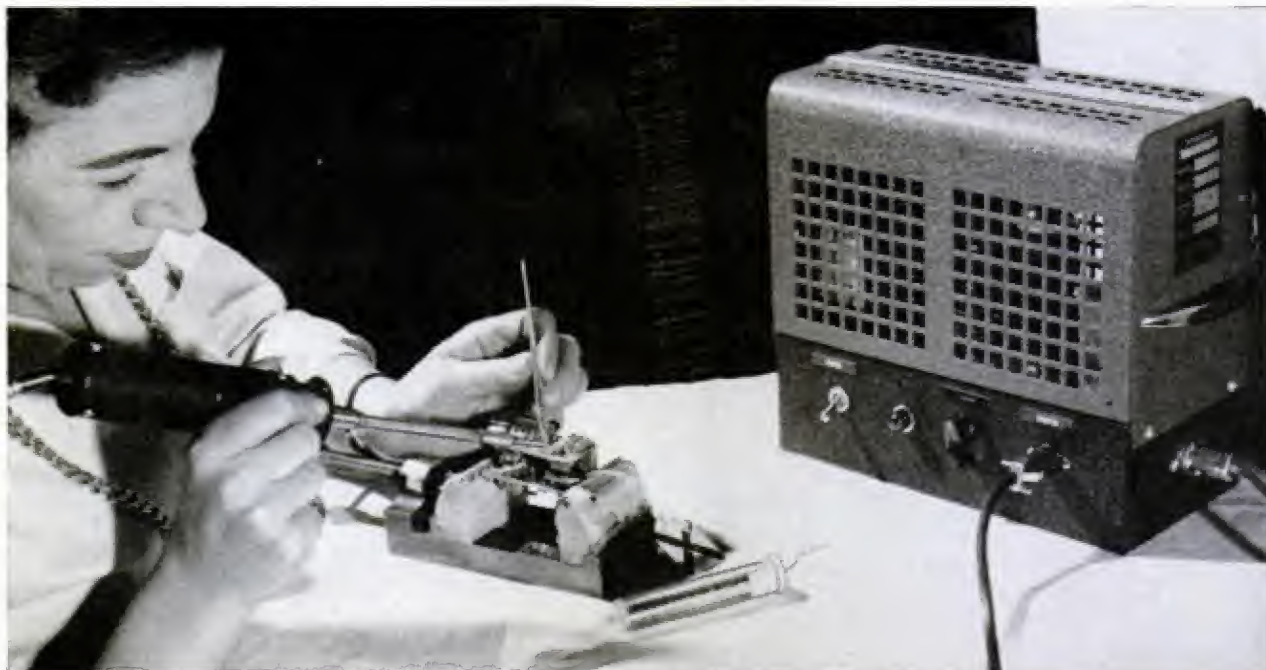
Each barge had two outboard engines that could be tilted when the vehicles neared the shore, and had ramps at the other end that could be lowered by hand winches for unloading. More than 4000 tons of equipment—drilling rigs, trucks, air-conditioners, house trailers, etc.—were transferred from ships in the Indian Ocean to the homemade barges and then to the shore. Somalia is on the Equator, incidentally, and has the world's highest *average* annual temperature—88 degrees.

Oilmen seem to work in areas where Mother Nature is at her meanest. One of these areas is *Rub' al-Khali*—"the empty quarter" of Saudi Arabia that even the natives avoid. Here temperatures rise above 130 degrees in summer, and a man alone could not survive more than 24 hours. The oil crews survived with the help of air-conditioned trailers, mounted on huge sand tires and grouped like wagon-train camps of the Old West. Geological crews operate out of these base camps, setting up outlying tent bases for day work, but return to

(Continued to page 228)

Supersound Moves

Soldering



Defoaming

SOUND WAVES pitched at more than 20,000 cycles per second—quite beyond human hearing—are performing miracles on production lines. They bore complicated designs into glass, solder materials without using flux and, among other things, quickly scrub hard-to-clean metals bright.

The vibrations of supersound are formed by transducers, which (like certain ceramics) vibrate when subjected to electric

current or (like sheets of thin nickel alloy in a coil) expand and contract, setting up vibrations in a radiating plate.

In the ultrasonic drill, the vibrations are imparted to a tool which does not cut materials (even glass!) directly, but transmits energy to a fine abrasive powder or slurry, producing a fast chipping action.

In ordinary welding, heat pushes molecules of two different objects into so much

Out of the Lab

Welding



TIP of soldering iron, opposite page, heats work in normal manner till solder flows; ultrasonic waves are then switched on, vibrating tip, causing solder to bond immediately. Ultrasonic welder, left, will spot or seam weld aluminum foil in thicknesses down to .00025 inch



TRAPPED AIR bubbles are removed from liquids, opposite page, by ultrasonic whistles; sound waves force the bubbles out. Drill, left, leaves no machine marks while vibrating at 20,000 cycles per second. One hundred grains of abrasive between drill and work cut about two million chips per second

Drilling

activity they flow together. Ultrasonics causes this flow cold, by rapid supersound vibration, making it possible, for example, to weld hermetic seals in foil containers holding food or drugs. Another benefit: Ultrasonic welders on the processing line can turn out a seam in seconds.

The ultrasonic soldering iron has its heating tip linked to a transducer, allowing the soldering of aluminum, for instance, which

has an oxide film that normally would interfere with tinning. The vibrations rip away this film, permitting the solder to bond to the surface of the aluminum. Obviously flux is unnecessary.

Ultrasonic cleaning is in wide use. A transducer vibrates detergent-filled water, causing bubbles to form then to implode (or collapse), releasing energy that cleans with crackling speed.



First Aid Via TV

Paris policemen televise close-ups of a victim at the scene of an accident to doctors who are then able to give first-aid advice even though far from the site. The portable TV camera is a new design.



Fresh Air for Sale

By inserting a 10-yen coin (about three cents) in a slot machine, shoppers in downtown Osaka, Japan, can get 20-seconds of refreshing oxygen. Individual sanitary paper funnels are placed over the dispenser.

Lighted Rubber Tubes Automatically Mark Traffic Lanes

Internally illuminated, automatic-rising traffic markers make it possible to change traffic patterns without the hazards of manual distribution of lane markers.

Made of silicone rubber, the markers are contained in housings which can be buried

in a street without the need of trench excavations. Individual holes are dug for the markers. They operate electrically, activated by remote control. Manufacturer is Nationwide Traffic Engineering Products Corp., Glenside, Pa.





Primitive Caveman? Nope—He's Electronic

Starting from a small sketch or a film strip, a Chicago firm builds and animates three-dimensional reproductions of cartoon characters for animated displays. The larger-than-life model of Fred Flintstone

was molded by Silvestri Art Mfg. Co., cast in fiberglass, hand painted, dressed in real fur, left, then equipped with electronic and mechanical innards, right. A pre-programmed tape controls his actions.

Runaway Air Force Jets Snagged by Nylon Cable

Similar to systems used on aircraft carriers to halt landing Navy planes, a cable system for snagging Air Force jets in danger of overshooting the runway is being tested.

A nylon cable is wound around two

drums buried on each side of the runway. When a jet hooks the cable, the cable spins the drums which drive hydraulic pumps. The hydraulic pressure operates on two aircraft wheel brakes which slow down the drums.



PM Shopping Guide



TAKE TIME to check drills and accessories. Your dealer can give you suggestions, catalogs

BEFORE YOU BUY a portable electric drill answer this question: What do I intend to do with it now and what am I likely to need it for later on? A portable electric drill with accessories designed to be chuck-driven is almost a complete power workshop. Let's say that first you need the power unit for drilling holes in wood or metal. You buy the drill for that purpose. Later you have a sanding job. You buy either a disk or orbital-sander accessory, and you're in business. Or you have a polishing job coming up, on the car or the furniture. You buy the polishing pad and you're all set to handle this chore. Acquiring a power workshop piece by piece from your local

CORDLESS DRILL is new. It's battery operated and works anywhere at full-rated power

NOTE HOW CLOSE this drill works to horizontal 2 x 4. Chuck is at right angles to motor



Portable Drills

dealer is as simple as that. Get the drill first, then buy accessories as the need develops.

And before you buy the drill learn about all the accessories available. Most of these are chuck-driven and can be operated with any drill. Others are quick-locked to the drill in driving position and can be used only with the drill for which they were designed. Know which is which and how they work before you buy.

Now the drill itself. It's the basic unit of the power shop and you should know what you're getting before you put your money on the barrelhead. Pictured at the right are four common types of grips, or handles, you'll find on portable drills. No one can tell you which is best for you. You'll have to judge that yourself. Heft the drill, get the feel of the grip in normal operating positions, overhead, horizontally and straight down. One of the first three types will probably suit you. On the fourth, with the spade handle, you ordinarily do not have a choice. You get the spade handle with nearly all $\frac{1}{2}$ -in. drills.

Size in a portable drill is the chuck capacity. A $\frac{1}{4}$ -in. drill comes with a chuck which takes a $\frac{1}{4}$ -in. twist-drill bit or a $\frac{3}{4}$ or 1-in. wood bit, or auger, with a $\frac{1}{4}$ -in. shank. This is the maximum size bit shank the chuck will handle. The same is true of the $\frac{3}{8}$ and $\frac{1}{2}$ -in. drills. Obviously all three units will handle twist-drill bits from about $\frac{1}{16}$ in. (fractional size) up to the maximum size. Of course, the maximum woodboring-bit capacity will be much higher, up to $1\frac{1}{2}$ in. for some $\frac{1}{2}$ -in. drills rated heavy-duty. Chucks A, B and C, illustrated on a following page are those commonly available. The geared chuck, C, is preferred.

Now study the cutaway view of a typical portable drill with a pistol-grip handle and the features keyed A, B, C and so on. Go over these closely, noting the chuck offset, G, which determines how closely you can work to a vertical or horizontal surface, and

TYPES OF HANDLES



PISTOL GRIP



SAW-HANDLE GRIP

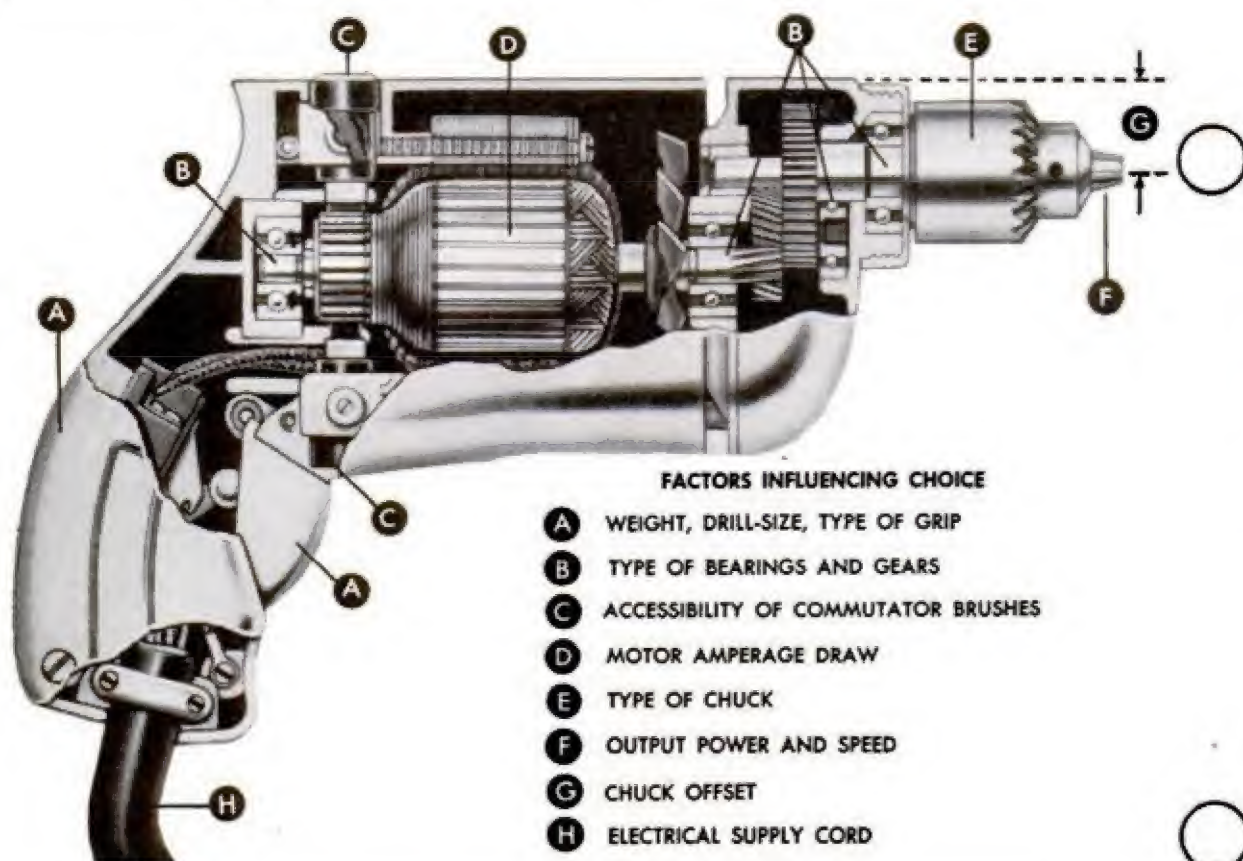


LEFT-RIGHT HANDLE



SPADE HANDLE

PM Shopping Guide



FACTORS INFLUENCING CHOICE

- A WEIGHT, DRILL-SIZE, TYPE OF GRIP
- B TYPE OF BEARINGS AND GEARS
- C ACCESSIBILITY OF COMMUTATOR BRUSHES
- D MOTOR AMPERAGE DRAW
- E TYPE OF CHUCK
- F OUTPUT POWER AND SPEED
- G CHUCK OFFSET
- H ELECTRICAL SUPPLY CORD

also the helical pinion drive and the ball bearings, B. This drill might be described as full-ball-bearing construction, that is, all rotating parts, armature, gear train and chuck, are mounted on ball bearings which reduce friction to the minimum. Such a drill might have a heavy-duty rating which normally means that it can be operated continuously at full capacity. A lower-priced drill of the same chuck capacity might be fitted with oilless sleeve bearings and be designed for intermittent duty only. Such drills are designed for homeowners and others who normally do not operate the unit continuously over long periods of time.

You'll find the amps. or amperage draw, D, on the nameplate of the drill. On $\frac{1}{4}$ -in. units this ranges from 2.5 to 3 amps., and is a measure of the power of the unit. Some $\frac{3}{8}$ -in. and $\frac{1}{2}$ -in. heavy-duty drills will be rated 5 amps. or more. On the nameplate you'll also find the no-load speed. The load speed will be considerably

lower and the manufacturer's literature usually gives both. On a $\frac{1}{4}$ -in. drill rated standard or intermittent duty the no-load speed might be given as 2500 r.p.m. and the load speed, which is the chuck speed under load, might be given as 1600 r.p.m. This is not a fault; it is a characteristic of all series (universal a.c.-d.c.) motors with which portable drills are normally fitted. On a $\frac{3}{8}$ -in. heavy-duty unit the no-load speed may be as low as 600 r.p.m. and the load speed 375 r.p.m. Drills with the lower speeds are designed for heavy-duty jobs such as boring large diameter holes in hardwood, driving large hole saws and the like. Some small drills are designed to be operated at two load speeds. The high-speed drill, which you as a homeowner will have more use for, does have some advantages over the slower speed unit. While such units do not have the power, or lugging ability, of the heavy-duty slower-speed drills, you just can't beat them for high-speed drilling in

Portable Drills

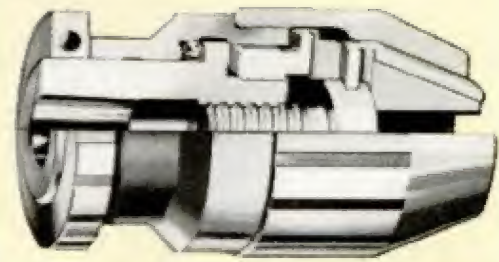


THIS DRILL is driven by power pack attached to user's belt. Operates at full power

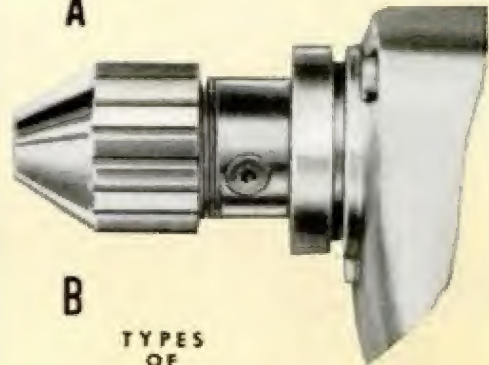
wood or metal and for sanding or polishing with a lamb's-wool pad.

If you must compromise, then buy either the $\frac{3}{8}$ -in. heavy-duty drill or the $\frac{1}{2}$ -in. standard-duty unit. You can use most of the accessories for the $\frac{1}{4}$ -in drill and the larger drills will handle any heavy-duty job. ★★

PORTABLE DRILL with nylon housing is shock-proof. Otherwise it's regular in size, weight

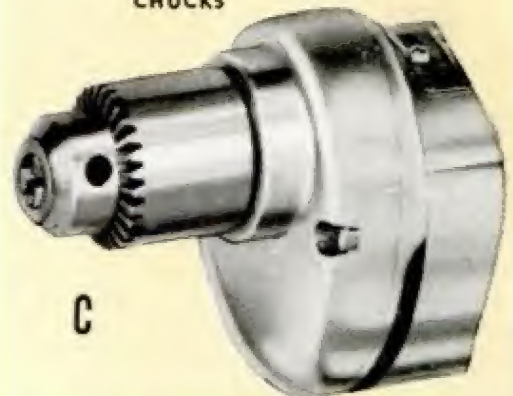


A



B

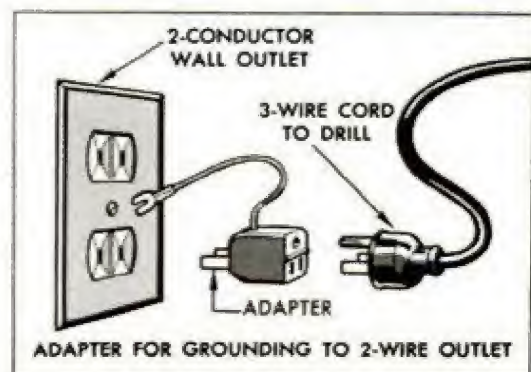
**TYPES
OF
CHUCKS**



C

THREE TYPES of chucks supplied on portable drills. Geared chuck, C, is most widely used

PORTABLE DRILLS come with 3-wire cords. Use adapter with ground in all two-wire outlets





OOPS!

UP AND OVER! Dune Riders' buggies—all hand fashioned—hit 70-mile-per-hour speeds on the rolling sands



ROARING over dunes around Arroyo Grande, a village south of San Francisco, Calif., 73 members of the Dune Riders club tear Sunday afternoons into dizzying, sand-spitting auto games. What autos! What games!

Action starts with a 50-mile-per-hour game of follow the leader when the pace car plunges down the 75-foot-high sides of a natural amphitheater. The drivers—housewives, breadwinners, young and old—bank into a dizzy whirl. Losing altitude, they peel off, gunning toward the bowl floor to shoot—oops!—over the lip on the opposite side.

Drivers build their buggies on shortened Model-A frames, for the most part. Rear-wheel rims are split and widened with nine-inch inserts. Front widths are standard; all tires are buffed smooth to keep tread from digging into sand. V8 engines are hopped up and set back so the center of gravity allows buggies to “fly” atop the sand.

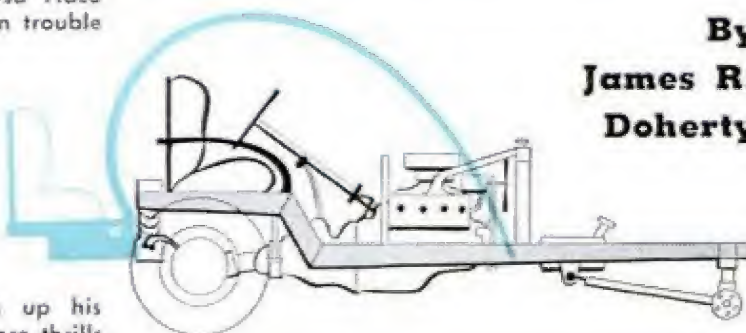
CONTACT. As car crashes to earth after leap over dune, passenger takes a spill

POPULAR MECHANICS



SETTING for high-speed games is near Osa Flaca Lake. Club members aid drivers who get in trouble

SETUP for buggy can look like this: shortened Model-A frame, stick shift with 1939 Ford box, V8 engine, Chevy or Model-A steering gear. Some builders attach an extra rear seat (shown) to fight gravity



By
James R.
Doherty

CLUB PRESIDENT, Chuck Johnson, whips up his Chrysler V8 engine for higher speed and more thrills





Sharklike Custom Body Is for Rear-Engine Cars

Aerodynamic principles received first consideration in the design of a sleek, 140-pound fiberglass body shell for use on any rear-engine car with approximately 80-inch wheelbase and 48-inch tread. Designer Henry Covington, St. Petersburg, Fla., says

that his car's 20-horsepower air-cooled engine moves it along at 80 miles per hour.

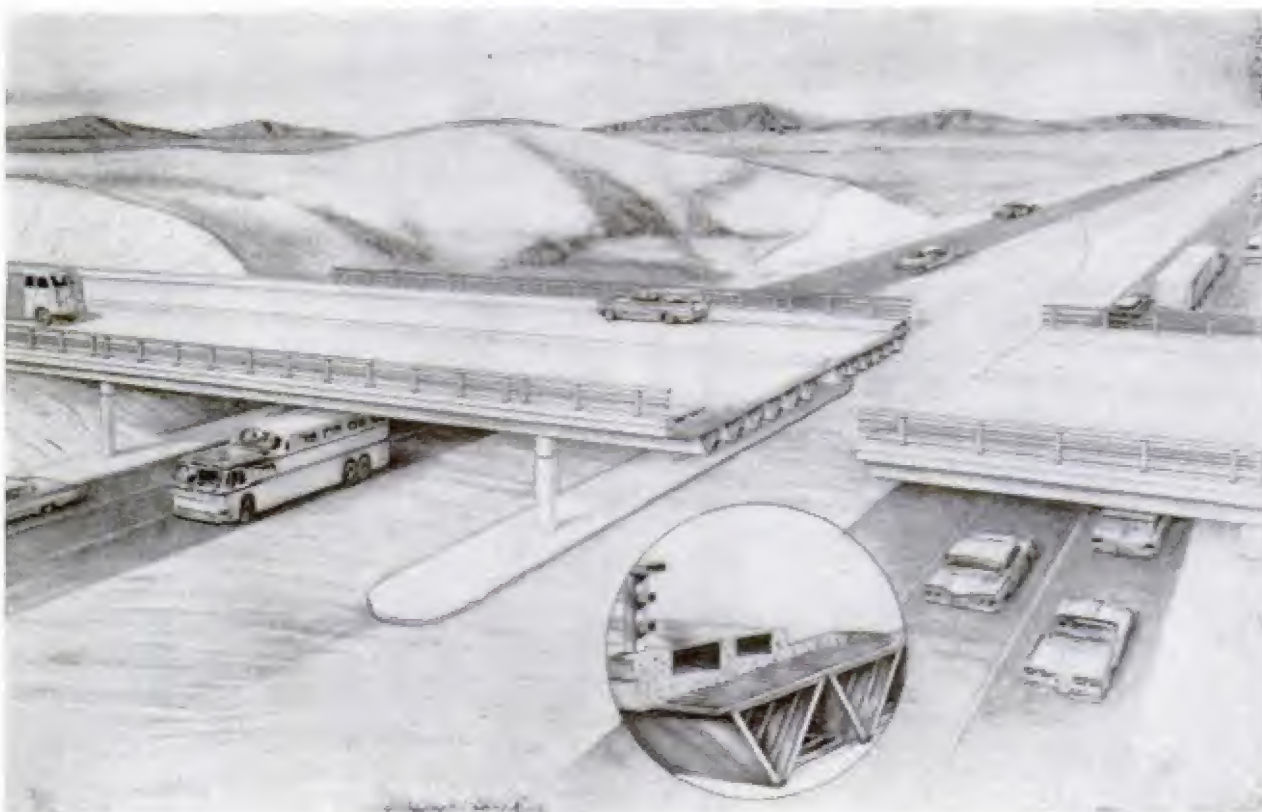
While over six years and \$4000 were invested in the development of this shell, he believes that bodies can be produced from the same mold to sell for \$400.

Aluminum and Concrete Bridge Spans Highway

Going into use at Amityville, Long Island, are two highway bridges that utilize aircraft-type aluminum members. Triangular-shaped beams bolted together edge-to-edge form the roadway base. Each beam is a cell fabricated from sheets of alumi-

num and stiffened inside with aluminum extrusions. Standard concrete paving was poured directly on the deck.

The bridges are 212 feet long and 86 feet wide; each has four spans made up of 76-foot and 30-foot beams.





Air Boat Skims Over Water at 75 Miles Per Hour

Powered by two aircraft engines, an air boat rides an eight-inch cushion of air and is capable of 75 miles per hour. One engine drives a reversible-pitch propeller mounted on the tail assembly, which includes a rud-

der. Another 160-horsepower engine forces air through jets on the underside of the craft, lifting it from the water on a cushion of air. The craft is owned by Reynolds Metals Co.

Hey, Stop the Countdown—It's a Truck

Looking as though it were set to take off into the sky, a truck dumping its load of wood chips at a pulp mill near North Bend,

Ore., runs up a ramp which is punched skyward by a long-fingered hydraulic lift. It tilts the truck as if it were a toy.



Now It's Used-House Dealers

By Jack B. Kemmerer

LAND CLEARING for Southern California's booming construction projects has produced an entirely new business in the last few years—the used-house lot. Like a used-car lot, it's a place where homes, displaced from their original sites, can be purchased, usually at surprisingly low prices.

Home movers once bought such houses, sold them where they stood, then moved them to the buyer's lot. But pressing construction schedules forced faster action than that, and the used-house lot was born. There are a dozen now in Southern California, and with 50,000 houses scheduled for moving in 1962, they may become commonplace across the nation.

Most used houses are less than 10 years old, but buyers find such bargains as two-bedroom homes for \$3500 to \$3900; three-bedroom models for \$5500 to \$5900, delivered to the buyer's lot. Even though installation costs range around \$1500, it's possible to buy a \$20,000 home for as little as \$8000 to \$10,000, depending on the cost of the lot.

WATER TRANSPORTATION is ideal for houses; it's comparatively less expensive and eliminates problems with traffic and street obstructions. This one was part of a group of eight homes moved 100 miles by barge



PROSPECTIVE BUYER shops in a Los Angeles used-house lot. Duplex at left is priced at \$7000; two bedroom house at center, \$4000; house at right, \$3900. Duplex has been cut in half for easier handling

ATTRACTIVE three-bedroom home in Hollywood shows no sign of its travels from another suburb. This big, new three-bedroom house required two nights for moving, which boosted the total cost to \$15,000

OFF TO THE LOT, a big two-story stucco house leaves its original footings. Moving tall houses is more expensive because of the cost of moving power and telephone lines enroute; this one cost about \$10,000







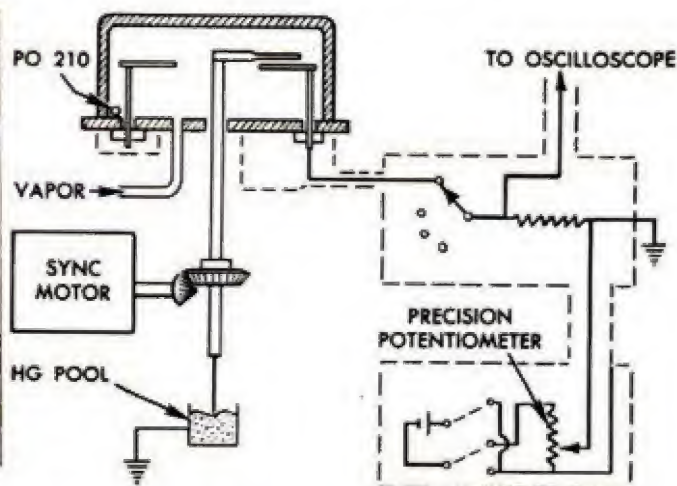
Motor-Driven Bar Bell Vibrates the Muscles

Twin electric motors in the bell ends vibrate a bar bell which can be used as a muscle relaxer or a spot massager. A pad is included for massaging.

The bar bell weighs 12 pounds and, when plugged in, vibrates the muscles as they

are exercised. It is designed to appeal to women as well as men—and to older men with heart conditions because it gives them a workout without all that work.

It retails at \$44.50. Manufacturer is Central Stamping & Mfg. Co., Polo, Ill.



Electronic Nose Sniffs Differences Between Smells

Odors can be measured, and the differences between them plotted by an electronic sorting apparatus. It uses common chemical substances—such as salt or egg albumin—to adsorb odor particles in a gold-lined chamber, creating an electrical impulse that can be read on an oscilloscope.

Dr. Andrew Dravnieks, consultant to Armour Research Foundation, Chicago, constructed the odor reader. He utilized the adsorbers, such as the salt, to simulate the way the moist membrane in the human nose picks up odors and creates electrical impulses to be "read" by the human brain.



Zip-On Plastic Tubing

Plastic conduit, tubing or sheathing can be zipped around wires, cables or ropes with an ordinary slide fastener built into a new plastic strip. Called Zippertubing, it can be zipped on and off easily for temporary shielding, or sealed into a permanent tube with a liquid sealer. It's available in 20 sizes and types, even tapered joint sections, from the Zippertubing Co., 13000 S. Broadway, Los Angeles 61.



Child's Chair Tips and Rocks

Made of the same durable material as a football helmet, with a seat insert of polystyrene, a child's chair spins, rocks, tips and twirls. The Tip-N-Rok is listed at \$9.75 (for ages 1 to 6) and \$12.95 (7-12) by Tip-N-Rok Sales Co., 137 Kennedy St., N.W., Washington 11, D. C.

FEBRUARY 1962



King-Size Floodlight

Four inches in diameter and five feet long, a new mercury-fluorescent lamp contains a mercury arc tube which produces high-intensity light. A phosphor coating on the outer casing improves color, quality. List price of the 330,000-lumen GE lamp is \$425.

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Thanks to Shifting Ocean Currents..... Saltwater

By Frank A. Tinker

BACK IN 1957, after a nine-year cold spell, the waters off our West Coast suddenly warmed. Although this warming amounted to only a few degrees, to oceanographers the shift was spectacular. To sport fishermen at ports like Long Beach and Monterey, it was even more so. Fish which had not been caught in respectable numbers for a decade became abundant. By 1959, 26 species had been reported far north of their usual range and 11 of these were the farthest north they had ever been found. Eastern anglers may some day observe the same phenomenon on an even more spectacular scale.

PARTY BOATS and private craft share the same water as West Coast fishermen enjoy their boom. Below, barracuda comes in the hard way



Anglers Hit the Jackpot



FAST ACTION aboard a party boat as four happy anglers play fish at the same time. Fifth angler, foreground, is unhooking his fat albacore. Dense schools of this tuna cousin provide plenty of thrills

The California catch of barracuda, for instance, had dropped to a mere 87,000 by 1956. But the next year, the first of the warm water, it jumped to more than 500,000 and has remained at or above this figure. These tigers of the sea, commonly associated with more southerly climes, are being hauled in by fishermen not only in California but off Oregon and Washington. They have even been taken by commercial trawlers off Alaska!

The wonderful yellowtail, who at ten pounds will outfight salmon twice his weight, rebounded from a yearly average catch of about 30,000 to nearly 200,000. Ling

and rock cod, some of them weighing 25 pounds, are now being caught with almost embarrassing ease, particularly off Monterey. White sea bass, which had retired to Mexican waters, has returned in force to the same area.

Perhaps the most spectacular invasion for the sport fisherman was that of the dolphin. This tropical favorite, cohabitor with the sailfish, was caught only rarely off the coast before the present influx, the largest number since 1947—only twelve—being hooked in 1954. In five years of the previous decade none were taken at all. But in 1957, over 3000 dolphin were hooked.



JUNIOR-SIZE fisherman inspects the gaping maw of his dad's catch, dwarfed by the giant black sea bass

In the same way, the tropical skipjack have become abundant all the way to Oregon. Striped bass, which in the west are usually caught in inland waters, became a surf fish on the West Coast during this warm-water period.

Marlin and sailfish have been sighted all along the coast by commercial fishermen, and swordfish have been taken frequently off Monterey.

Fortunately for the visiting angler, this return—or visit—of the southern fishes has inspired a revival of the sport fisheries here which surpasses anything known before. The number of private boats docked has soared, and coastal communities have been forced to enlarge their mooring facilities. Yet harbor space remains scarce in some



PARTY BOAT heads home after a good day, and two lady anglers show off their share of the yellowtail catch

ports. For the angler who has neither the opportunity nor the desire to float his own craft, nearly every dock has party-boat skippers or launch owners ready to oblige.

In Monterey, where idle sardine canneries stand as mute memorials to the wayward ways of that little fish, the new sporting industry has taken up some of the slack. Launches began seining for these "fire-crackers" and small squid as bait when the white sea bass returned four years ago.

Explaining the Warmup

As for the warming of the West Coast waters, Mr. John Radovich, oceanographic expert of the California Fish and Game Service, explains it thus:

"We should realize that the 'normal' situ-



BOTTOM FISHERMAN, using a multiple-hook, heavy-duty rig, brings in a double—a matched pair of rock cod

ation is controlled almost entirely by the several sea currents and fairly constant winds which transport great masses of water into and out of the fishing grounds. To raise the water temperature even these few degrees would have required the completely efficient burning of more than half the world's oil reserves. Certainly solar radiation—the only oceanic source of heat—was insufficient to bring about this change in such a short time."

Thus the gist of the scientific deductions both here and in such authoritative offices as the Scripps Institution of Oceanography at La Jolla is that the water did not actually warm as it lay along the coast, but was warm to begin with and moved into the area from elsewhere. Yet both of the currents which make this potentially one of the finest sport fishing waters in the world are cold. The California Current, which

sweeps down from the Aleutians, is part of the great clockwise surface movement of the north Pacific. Running about 650 feet below it, ordinarily, is the Davidson Current, which proceeds in the opposite direction. Both these currents are considerably colder than the water farther offshore and both are rich in the phosphate nutrients which eventually feed all marine life.

During the winter, the lower Davidson Current rises to the surface near the California coast. In addition, the prevailing winds provide an offshore movement of the surface waters, thus bringing an upwelling from deeper regions where the temperature is even lower. The year-long effect of this system is to provide the West Coast with a relatively cold belt of water which separates it from the warm waters of the central Pacific.

The speed of this protective surface Cali-

The World's Ocean Currents Lead



MAJOR OCEAN CURRENTS which affect fishing. Circled area shows the area enjoying the warmup, as the southbound California current slows to let warm eastbound Pacific water into range of West Coast fishermen

fornia Current as it proceeds down the coast is only a little over half a mile per hour. And apparently some of this speed is due—or related—to the prevailing winds. An almost permanent low-pressure zone is located just off the Aleutians.

During the past "cold" decade, these winds kept the California Current moving southward at its ordered pace. In addition, they provided enough offshore movement to bring up the cold water from below. Then, about the latter part of 1956, something shifted. The Aleutian "low" moved closer to the continent and enlarged, and the winds slowed.

When the winds died down, the California Current meandered, and in moved a part of the waiting, warmer Central Pacific mass. Samples of zooplankton taken along the coast show definitely that the new water is not from the south, although its accompanying fish are. Further, the increased salinity and higher oxygen content are typical of the Central Pacific waters. Thus the West Coast has, in effect, been moved

out into the ocean a critical distance and the fish schools, ever on the alert for better feeding and spawning grounds, have moved in to take advantage of the situation.

The warmth itself has not exceeded six degrees Fahrenheit, which boosted the temperature at Monterey to a consistent summer level of about 70 degrees. At the Scripps Oceanographic Institution, the average annual sea temperature during 1955 was 61.7 degrees and in 1957 raised to 63.2, certainly not a startling change to anyone but a fish. However, the warmer months were the most important, since they included the spawning season.

The warming caused by this intrusion of the water mass from the west extended down just over 300 feet in 1957, somewhat deeper since, and this has affected the sport fishing most of all. Species which are normally caught here are surface feeders who spend most of their time in this upper layer. The commercial fish run deep, and between the two are other types which strangely go unharvested.

. . . . Fish—and Fishermen—Follow



MORE PARTY-BOAT ACTION—above, good-sized barracuda on his way to an unexpected landing in the boat

Of course, mixed with the good effects of the warming are others not so pleasant. While the bonito fishing off Oregon and Washington has improved, the coastal salmon catch in some of these areas has declined. After the first warm year, the albacore came in on their annual shoreward trek 150 miles north of their usual habitat. Although this had been predicted by the oceanographers, much of the commercial fishing fleet went to their traditional grounds—and were skunked.

What of the future? Is the California coast destined to become a happy extension of the Mexican sport-fishing wonderland? Will marlin and other tackle-busters be hunted off Oregon? All this is very doubtful. In fact, those who want to share this bonanza would do well to get in their licks soon.

This is not the first time the warm water has moved in, nor will it be the last, although it is the longest such trend on record. In 1926, 1931, and 1941 the temperature of the water rose similarly, and Mr. Radevich recently dug up old records

which showed that in each case the angler success followed the temperature upward.

But after each such cycle of warmth there has been a period of cold—and a resultant dearth of good fishing. The last such subnormal period, from 1949 to 1957, was the longest cold stretch in the sketchy history of these waters. From recent studies by agencies in the California Cooperative Oceanic Fisheries Investigations (CCOFI), comes information which may possibly signal the waning of warmth and its attendant fishing boom for California. For at the same time the water warmed here, it cooled off near Japan, apparently from a cold-water mass intruding in much the same fashion as its warm counterpart did off our shores. Such a cold mass began a slow march directly across the Pacific in 1957 and was first scheduled to reach here in 1958. Fortunately, it slowed and the arrival date was moved ahead to the spring of 1960. But then the mass halted completely, about 800 to 1500 miles off the coast, where it remained until 1961. Readings

(Continued to page 218)



FREESTANDING FIREPLACE fits into a corner. Inner and outer walls of fireplace are heavy-gauge steel; the outer jacket is lined with fiberglas. Price is about \$255 from Dura-Vent Corp., Redwood City, Calif.

WHAT'S NEW FOR



BRUSH AND COMB HOLDER attaches to wall. Plastic case cleans easily with a damp cloth. Personalized unit sells for \$2.50 (plus 10 cents postage) from Crown-Craft Products, 3-5 Mt. Hope Pl., New York 53

SLACK AND SKIRT HANGER operates like giant clothes-pin to hold garments securely. It's made of plastic and metal. Sold three for \$1.98, the hanger is manufactured by Mission Industries, Escondido, Calif.



LIGHT BULBS and fuses are neatly stored in plastic rack that mounts with screws on wall or cupboard. Price is \$1 (plus 25 cents postage) from Harold Franzen & Co., 171 King Bldg., Flanagan, Ill.





AIR-CONDITIONED RANGE whisks odors away through slot in range cover; when cover is closed, it provides extra counter space. Manufacturer is Jenn-Air Products, 1102 Stadium Dr., Indianapolis 7, Ind.



WATER TEMPERATURE for shower or tub can be selected and maintained by thermostatic control. Price of Hydroguard control is \$60. The manufacturer is Powers Regulator Co., 3400 Oakton St., Skokie, Ill.

TELESCOPING DESIGN of shutters enables homeowner to fit them to any size window. Made of steel or aluminum, Adjust-A-Shutters fit heights from 27 to 70 inches. By Addison Products Co., Addison, Mich.



LETTER SCALE determines amount of postage. Worldwide postal rate booklet included. Scale that weighs up to two ounces sells for \$2.95; up to 10 ounces, \$3.95, from Apalt Specialties, Box 431, Oakdale, N.Y.



Science Climbs the Mountain Peaks

By
Richard Dempewolff



HANDIEST WAY to Sonnblick Observatory, in Austrian Alps, is by helicopter



GLACIER

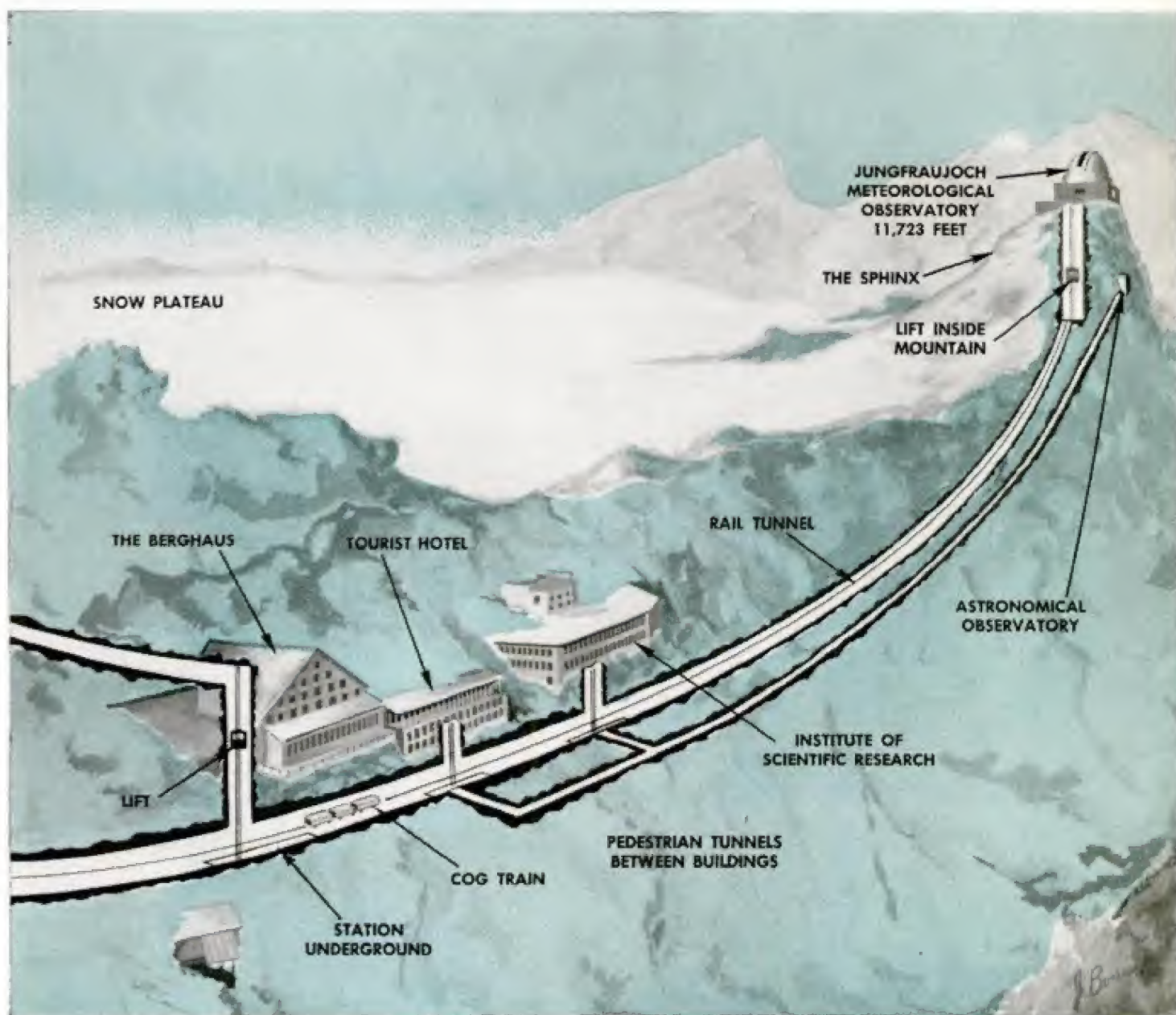


THROUGHOUT THE WORLD, scientists have been setting up shop in the sky. To reach their stratospheric eyries perched on rocky pinnacles above the clouds, they dangle over alpine peaks on aerial cableways. They grind upward in cog rail cars through tunnels and shafts carved in the living rock of 18,000-foot mountains. They hairpin their way up jagged snow-swept slopes in tracked vehicles and multiwheeled lorries, and ski along razor-edged rims of breath-taking

cols that drop away in sheer 3000-foot cliffs to white altiplanos below.

Halfway to the stratosphere, where most of some 50 modern, well-equipped high altitude laboratories (7500 to 18,000 feet up) are perched today, the cold, thin air doesn't lend itself to human comfort. But it is an ideal place, for instance, to study cosmic particles pouring in from outer space before most of them collide with gas nuclei in the air, and explode into totally different particles. Some of these cosmic

Sky-high observatories studying cosmic rays and high-altitude living are helping to sketch in our plans for exploring outer space



SWITZERLAND'S JUNGFRUJOCH Observatory, some 12,000 feet up, is reached by railroad that tunnels five miles

radiations—from the sun and from exploding stars far out beyond our solar system—make the radiations in the Van Allen Belt pale to insignificance. If for no other reason than manned space flight, it is vital to know about them.

"If intense cosmic radiation storms can be predicted," one observer points out, "tomorrow's astronauts may be able to find refuge behind the Earth or the moon until the bombardment subsides."

In their high-flung labs, astronomers

view the night sky unhampered by distortions of the two miles of dust and moisture-laden lower air. Radio astronomers set up electronic ears and listen to cosmic radiations without picking up a cacophony of man-made background noise. Meteorology, solar radiation, sky glow, glaciology, magnetic field studies, geology, botany, astrophysics and even physiology are among many fields for which whole new vistas have been opened by development of these sky-high observatories.

Swiss scientists study snow control; Austrians live among active glaciers

In the crystal air 11,134 feet above the Pacific Ocean, for example, scientists on the slopes of Mauna Loa have been examining the solar radiations reflected from the surface of Mars. By analyzing them with spectrograph, they hope to measure the planet's moisture content and determine the ability of Martian climate to sustain life.

The International Geophysical Year, 1956-57, really put the spotlight on high altitude research. It was in the high-flung laboratories that many dramatic discoveries were made. From mountain stations in the far north, and from observatories on the two-mile-high Antarctic icecap, came proof that auroras appear simultaneously over both poles. The labs contributed data about new fields of cosmic radiation high above the earth. And it's still going on. Through the big telescopes on Mt. Wilson and Mt. Palomar, Dr. Jesse Greenstein recently identified what appears to be either a brand new star, or a whole new universe composed of elements that appear to be different from any known to man. And at the observatory atop Pic du Midi, in France, Air Force scientists are making an intensive study of the moon. By analyzing the changing shadows around the boundary between the dark and sunlit sides as it moves across the moon's surface, they are creating a highly precise moon map. Reason: To prepare complete details of that area of the lunar surface where the first space ships are most likely to land.

Highest of the skybound research stations is Dr. Ismael Escobar's 18,000-foot-high meteorological hut of the Chacaltaya Cosmic Ray Laboratory, some 20 miles from La Paz, in Bolivia. Up here, the temperature drops below freezing every day of the year. And the atmosphere, only half the pressure of air at sea level, is so thin that even men conditioned to high mountain air must work in shifts. At the end of three days, they are forced to return to lower altitudes to catch their breath.

Clinging 12,000 feet high on the side of Mount Fujiyama, in Japan, is a weather station where scientists are delving into the formation of rime ice. This is the ice formed from droplets of super-cooled water that builds up on airplane wings and destroys their lift. At the 10,000-foot Sonnblick Observatory in Salzberg, Austria, glaciologists live with neighboring active glaciers, studying their movement and their effect on the terrain.



SNOW FENCE, an experimental avalanche retainer, is one of variety tested at Weissfluhjoch, Switzerland

HIGH IN the German Alps, a weatherman takes a wind reading atop Zugspitze Observatory (at right)





Hans Truul photos

WEISNFUJOCH LAB, 9000 feet high, investigates effect of sunlight on paint, among other things, for industry. But a primary job is to prevent avalanches with fences. To test, they start small ones with exploding shells

PROMENADE DECK, under construction at Zugspitze, will look like this when finished sometime this year. In foreground is entrance for cable car. Three men staff the observatory which concentrates on Alpine meteorology



From the top of the Alps to the Clouds of Colorado:



MEN OF WEISSFLUHJOCH measure snow pressure and density on instruments spaced around three miles of mountainside. Right, avalanche researcher monitors precipitation meter; it registers snowfall electronically

In Switzerland, on the 8,737-foot horn of the Weissfluhjoch, some 20 sunburned scientists of the Swiss Institute for Snow and Avalanche Research study the prevention of disastrous snow slides. Their experimental devices, for holding cubic miles of snow in place, stud the slopes. Vast arrays of instruments measure snow density and movement as the avalanche-producing spring thaws set in. Rescue teams, working with the Weissfluhjoch station, can be brought to the scene by dialing 11 on any telephone in the area. The laboratory keeps a team of 143 "avalanche dogs" trained and ready to help find people caught under tons of snow. Recently, one dog smelled out a pair of tourists who had been buried under an avalanche for more than two hours. They were still alive when dug out.

At the University of California's White Mountain laboratories, where a series of camps are spotted at heights up to 14,246

feet, you're likely to find all kinds of odd things going on. For one whole season, the University's Dr. Leo Delsasso fired a cannon from one peak and recorded its sound, via microphone, on another peak a mile and a half away. Object: To study the characteristics of sound traveling at high altitude. And for a time, the 12,500-foot Barcroft Laboratory on White Mountain had a menagerie of dogs, sheep, chickens, turkeys and mice, used in experiments involving high altitude metabolism. The chickens soon lost a third of their body weight and quit laying eggs. But turkeys, raised on the heights from day-old chicks, developed larger hearts and blood volume than normal, and thrived. Oddly, such adaptiveness doesn't always last. A colony of mice bred on White Mountain quickly adjusted and raised a rapid series of families. But after several generations, reproduction dropped, growth was stunted and the creatures developed liver troubles. As

Research to control environment or to live with it



JET PILOTS climb treadmills 14,000 feet up at Mt. Evans, Col., to build tolerance for high-altitude work. Photometer, right, measures sky glow, a phenomenon of outer atmosphere, from Fritz Peak, Colorado

soon as the colony was returned to sea level, the mice became normal within one generation.

What it all means, no one is sure yet. But with man stepping across the thresholds of space, it grows increasingly important for him to know the limits of physical endurance and the adaptability of his physical machine to unfriendly environments. At San Nicholas, in Peru, the Institute of Andean Biology has an isolated outpost laboratory on an Andean peak 16,500 feet above the coastal city of Lima. For years, a group of Peruvian scientists under Dr. Carlos Monge, the Institute's Director, and Dr. Alberto Hurtado, Director of Research, have been studying the effects of altitude on people. Here, where the Andes soar out of the sea to precipitous heights of 20,000 feet, the Institute has established four laboratories—one at sea level in Lima and three in the mountains.

Scientists reach the mountain stations

by way of the Central Railway of Peru, short-cutting through 80 tunnels, and clinging to precipices where there's scarcely room for a mountain goat. Or, they may drive up the road that weaves through deep gorges, snakes through clouds, and hems the rims of mile-high vertical palisades, while an overworked supercharger gulps the thin air with an endless sigh.

At Morococha, after 90 tortuous miles, even rugged men unaccustomed to the rarified air in the mining town, pant from the exertion of getting out of the car at the 14,900-foot altitude, flop weakly into chairs and complain of light-headedness. Often their demoralization is made complete by the sight, through the lab's big windows, of Peruvian miners racing around outside in a vigorous game of soccer.

These mountain Indians, with barrel-like chests and stocky legs set far apart, are peculiarly adapted to life at high altitude. They are the primary reason for



FROSTED DECORATION atop this 10,188-foot Austrian peak is Sonnblick Observatory. Two staff men live here

these Andean labs. In the stone and glass station at Morococha, these mountain men sit for long periods in a huge, spherical altitude chamber, where atmospheric pressures are raised and reduced while scientists study a battery of instruments to observe reactions. X-rays of native lungs and rib cages are taken. A five-foot, three-inch mountain Indian has the chest of a sea-level six-footer. Indians work out on a treadmill while their oxygen intake and metabolism are studied. In one experiment, Dr. Hurtado took a group of sailors up the mountain. The men had managed 30 minutes to an hour on the treadmill at sea level. After a month of adapting themselves to Morococha's altitude, they could stay on the mill only four minutes. Indians who had lived on the mountain since birth kept the treadmill turning for up to 96 minutes. What the scientists want to know is why?, how?, what happens in the body tissues? And does heredity play a part in this ability?

The work has turned up some interesting facts. The mountain man's bone marrow turns out many more oxygen-carrying red blood cells than is normal for sea-level people; sea-level dwellers *do* adjust to high altitude and their body systems learn to compensate gradually over periods of years, though they may suffer periodic headache, nausea, and weight loss. In one year at Morococha, Dr. Hurtado lost 32 pounds.

Are Peruvian mountain men designed by heredity to tolerate stratospheric heights? Dr. Hurtado doesn't think so. "The high altitude tolerance acquired by newcomers," he says, "is based on respiratory, circulatory and blood changes, while the tolerance present in a man born and raised on the heights is chiefly to tissue adjustments. These are deep-rooted adjustments and we are trying to determine more about them."

Actually, the ability of men to adjust to high altitude is important for more immediate reasons than future space plans. At the 14,000-foot Inter-University Laboratories on Mt. Evans in Colorado, Air Force scientists have been running jet pilots through a series of rugged tests to study the effects of accelerated breathing and oxygen starvation. The work began, according to the Air Force's Dr. Bruno Balke, because of several unexplained airplane accidents at high altitude.

Pilots from the Air Force's School of Aviation Medicine in San Antonio, spent weeks climbing a tilted treadmill whose slope was increased every 60 seconds. They pedaled a stationary bicycle with a braking device to make the work progressively tougher. They went mountain-climbing, carrying loads of rocks. With oxygen masks, they sat in a mockup pilot seat, handling controls as oxygen supply was diminished until their breathing came

(Continued to page 220)



EASILY installed remote TV listener permits you to hear TV silently. Switch and volume control on remote unit permits normal set operation as well. \$8.91, Telex Inc., Telex Park, St. Paul, Minnesota



PHOTOELECTRIC night light automatically turns a lamp on at dusk, turns it off again at dawn. Plug lamp into unit, plug unit into wall. \$9.95, Sampson, Inc., 2244 S. Western Ave., Chicago, Illinois



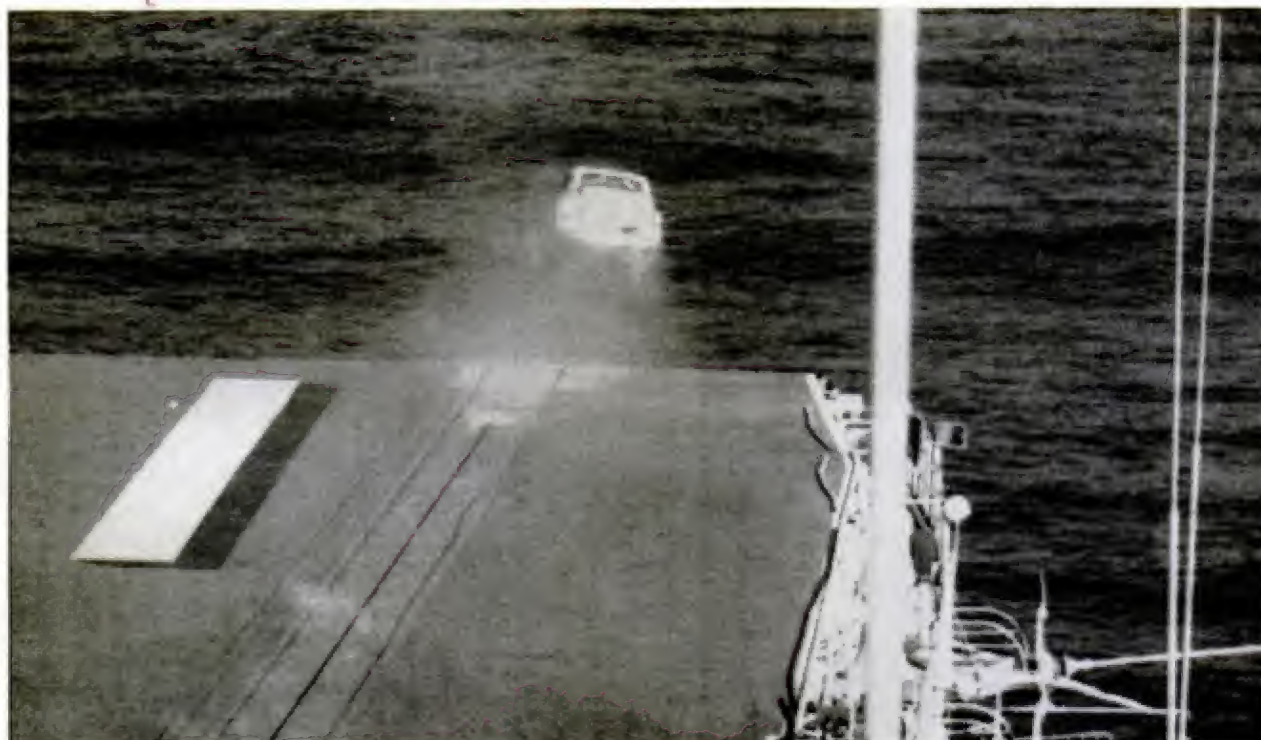
New in Electronics

CAN YOU FIND the speakers? Actually, there are two in the picture. One is hung on the wall, the other disguised as a set of books. The units can be used with stereo equipment, phonographs or TV sets. Each component is equipped with a 25 foot length of cord. \$14.95 and up, Sears Roebuck & Co.



NOW YOU can see your tape recordings! Immerse a piece of recorded tape in the special solution, and you can inspect it under special lens to get closeup view (inset). Excellent check for head alignment and tape editing. Called Magna-See, kit sells for \$12, Reeves Soundcraft Corp., Danbury, Conn.

(see APRIL 1962, p. 8)



For That Trip to Davy Jones' Locker, Travel by Car

When someone got the bright idea of disposing of junked automobiles by sending them to the bottom of the sea, someone else asked the bright question, "Who's going to drive them?" The bright answer: "No one. Just catapult them off the deck of an aircraft carrier.

Actually, it was all part of a program cooked up between the National Safety Council and the Navy. The idea was to help rid the nation's highways of unsafe automobiles by sending them, as the Navy sometimes does its discarded ships, on that long voyage to Davy Jones' locker.

Mechanical Fencing Master Drills Students

"Trained" to duplicate the defensive response of a live fencer, a spring-loaded mechanical swordsman drills fencing students for instructor Bela de Tuscan, of Fort Lauderdale, Fla. Designed to spare the teacher the routine task of defending himself while a student practices offensive

movements, the mechanism provides realistic drills in beat attacks and disengaging and binding movements. Knobs control the spring tension in shoulder and elbow joints, allowing the instructor to provide slow responses for beginners, or lightning-quick movements for more advanced students.





Golf, Groceries, Gardening — Three-Wheeler Handles 'Em All

Put a large market basket on the front of a new three-wheeled scooter and it can be used for trips to the store. Attach a lawn mower and use it for grass cutting, or attach a trailer for rubbish hauling; put on the sulky seat and there's room for two. At the golf course, the golf bags attach to

brackets on the steering column and the handle holds golf balls, tees, score cards, pencils and other objects. On flat courses, it will transport two golfers.

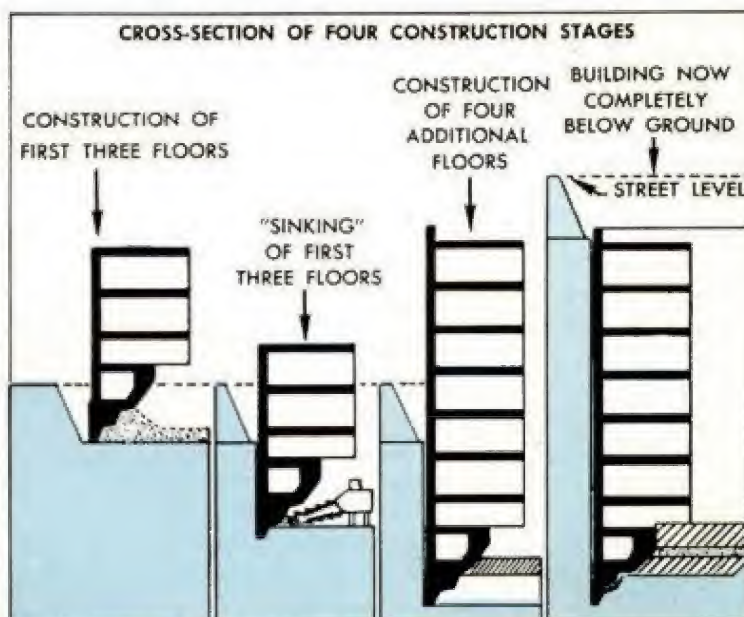
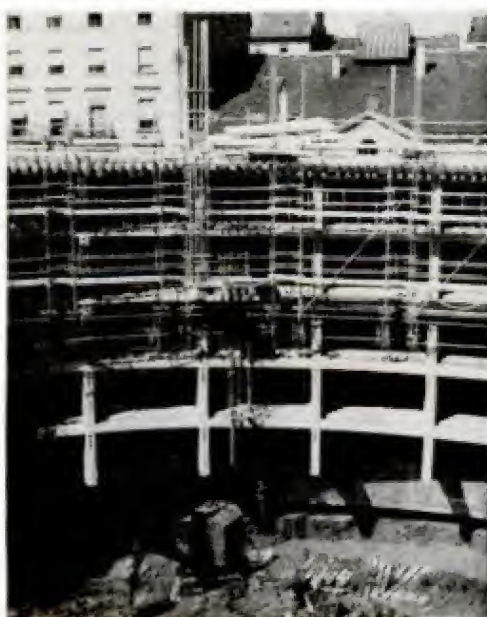
The scooter, manufactured by the Flinchbaugh Co., 390 Eberts Lane, York, Pa., can be stowed in the trunk of an automobile.

Dig This Crazy Building! It Was Built Down Instead of Up

Sidewalk superintendents in Geneva, Switzerland, had a rare treat recently—a building that sank as fast as it was built.

A steel cutting edge was at the base of the circular seven-story garage, and on top of it was a hollow concrete ring divided into chambers. If one side of the building sank

faster than the other, the high chambers would be filled with water, weighing that side down. As more stories were added and the building sank—about four feet per day—excavators hauled away soil from the center. The garage was built underground so it could double as an emergency shelter.



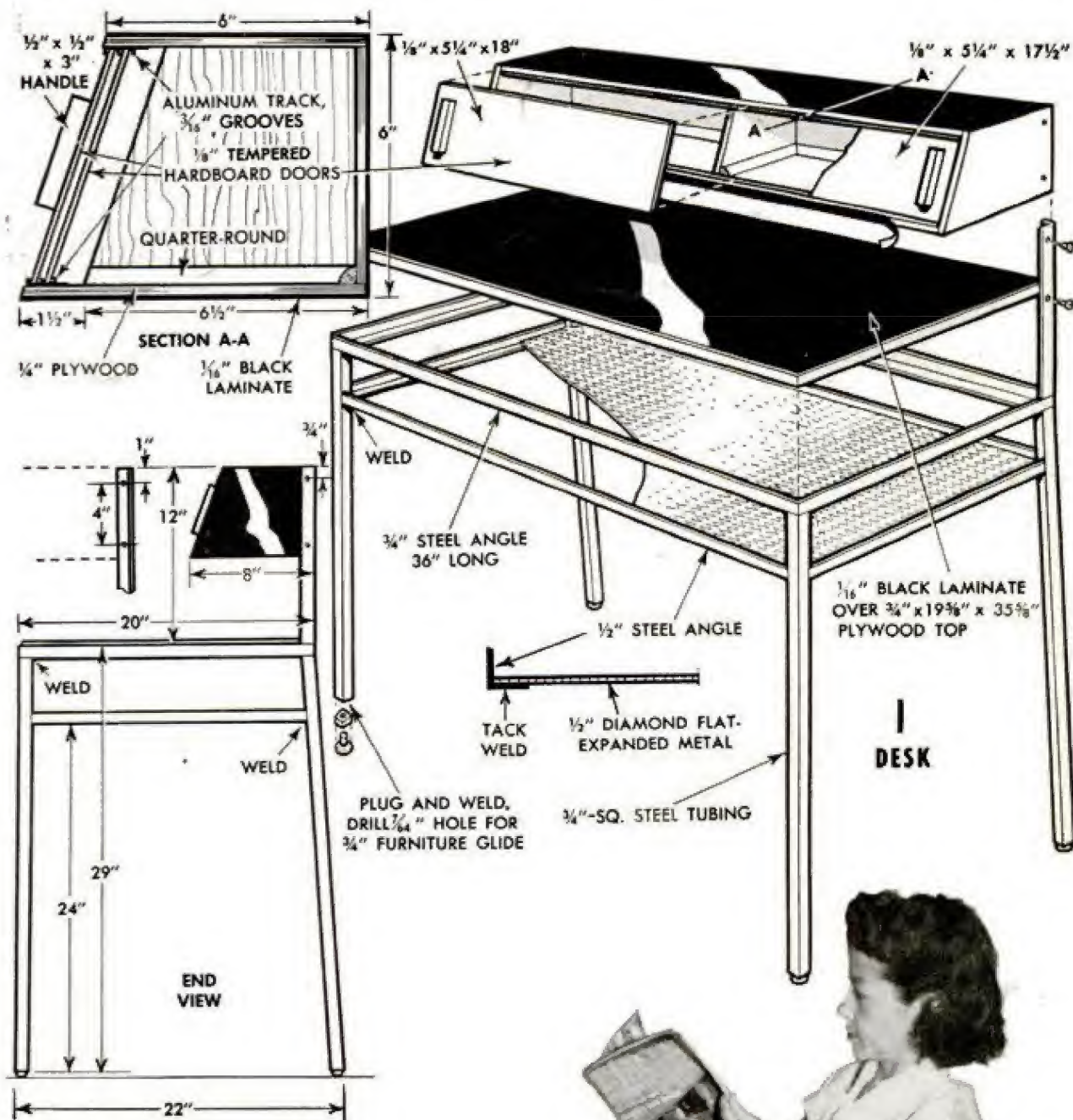


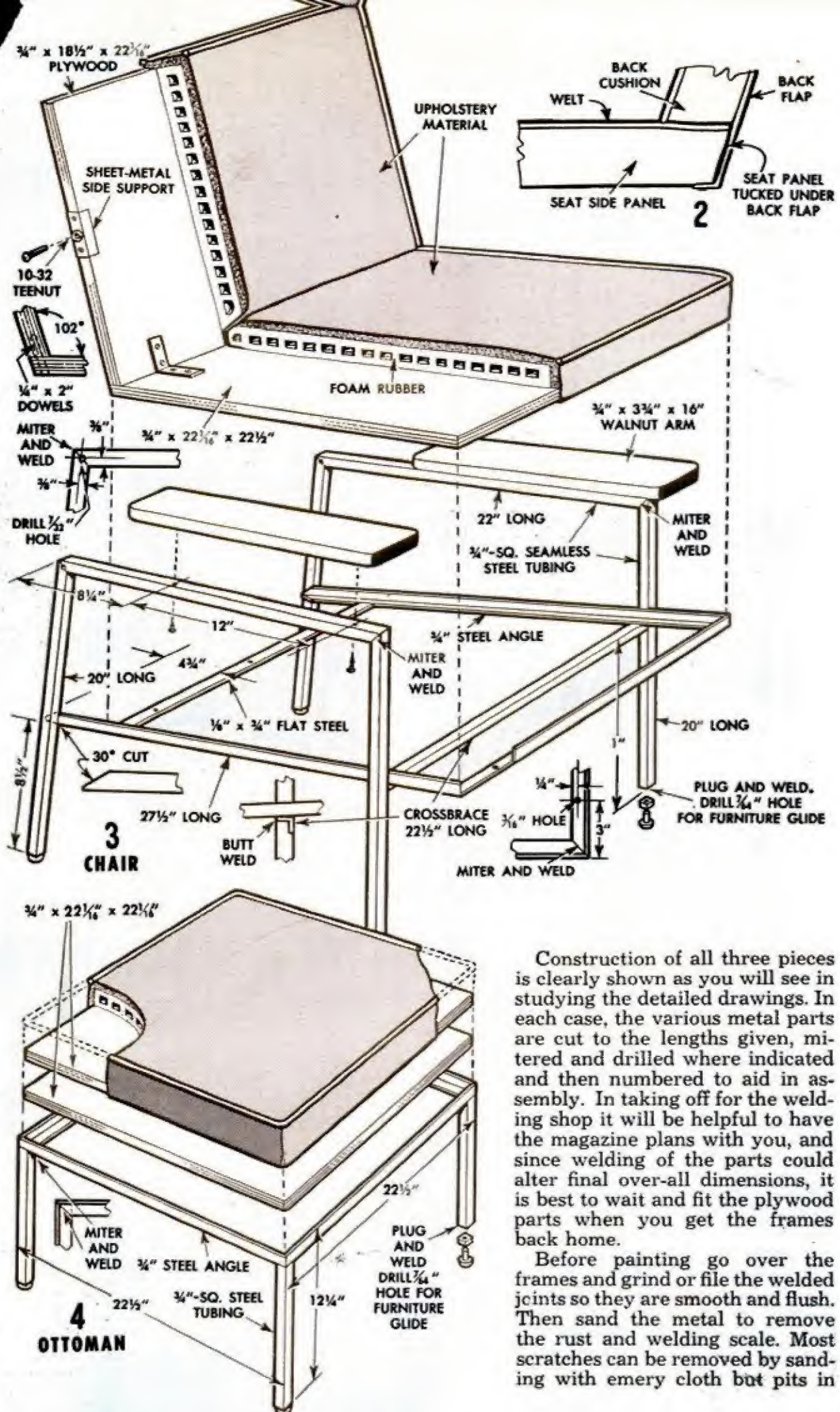
Clean-Line Metal Furniture

By Arne O. Vidstrand

YOU'D PAY a pretty penny in a store for this smart contemporary metal furniture. Made in your workshop it will cost little more than the price of the material, especially if you have a home welder. If welding is something you can't do, a local welding shop will do it for you for a nominal fee. The metal parts of all three pieces,

the desk, arm chair and ottoman, are made from $\frac{3}{4}$ -in.-square seamless steel tubing and $\frac{3}{4}$ -in. steel angle. Additional $\frac{1}{2}$ -in. steel angle is needed to support the expanded-metal shelf for the desk, $\frac{1}{8}$ x $\frac{3}{4}$ -in. flat steel for the chair, and except for the chair arms which are walnut, all the rest of the wood parts are cut from $\frac{3}{4}$ -in. fir plywood.





Construction of all three pieces is clearly shown as you will see in studying the detailed drawings. In each case, the various metal parts are cut to the lengths given, mitered and drilled where indicated and then numbered to aid in assembly. In taking off for the welding shop it will be helpful to have the magazine plans with you, and since welding of the parts could alter final over-all dimensions, it is best to wait and fit the plywood parts when you get the frames back home.

Before painting go over the frames and grind or file the welded joints so they are smooth and flush. Then sand the metal to remove the rust and welding scale. Most scratches can be removed by sanding with emery cloth but pits in

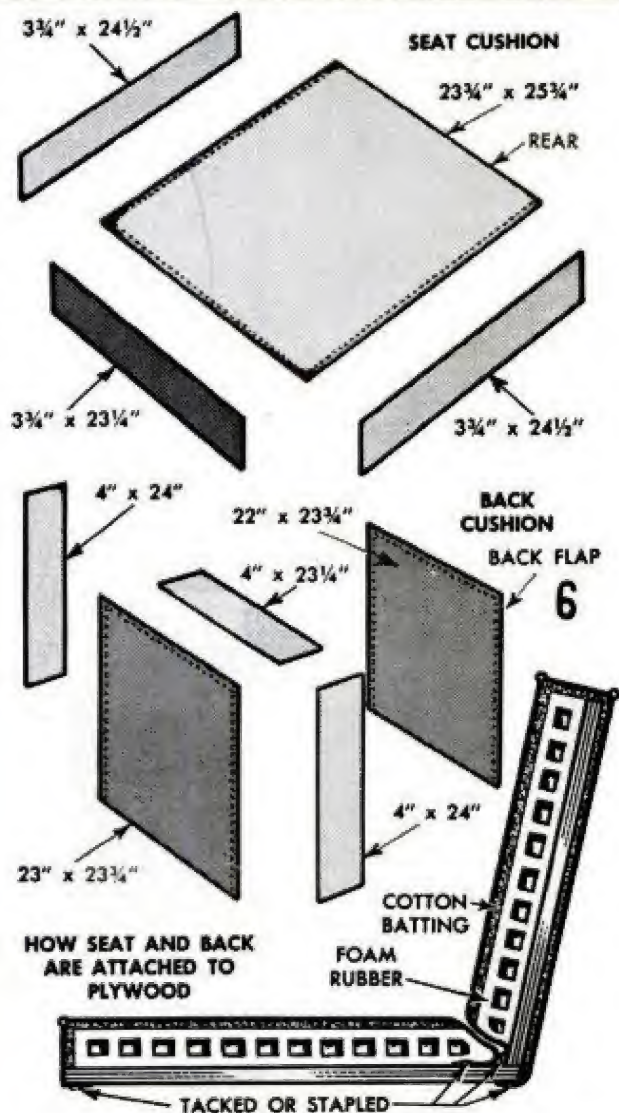
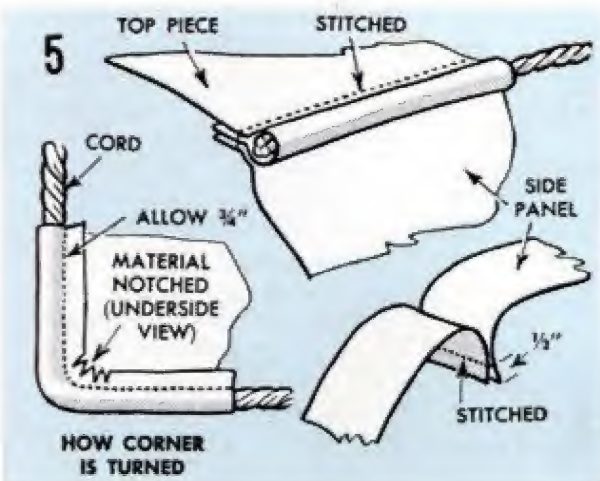


the metal may have to be filled with plastic auto-body filler. Give the frames a final wet sanding with No. 280 sandpaper and water, followed by washing with vinegar.

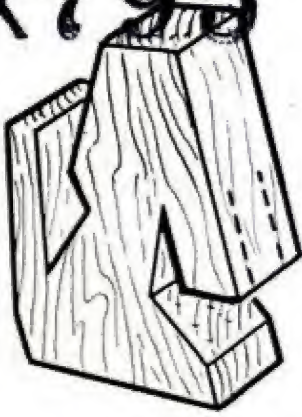
The original frames were sprayed with two coats of white auto lacquer. Begin by applying two coats of lacquer primer, sanding after each coat with No. 320 wet or dry paper, using water as a wetting agent. Then apply the lacquer, again sanding between coats. The frames are completed by inserting $\frac{3}{4}$ -in. dome glides in the ends of the legs and cementing with epoxy cement.

The desk writing surface, Fig. 1, as well as the sliding-door cabinet, is finished by covering the exposed wood surfaces and edges with black decorative laminate. The

(Continued to page 212)

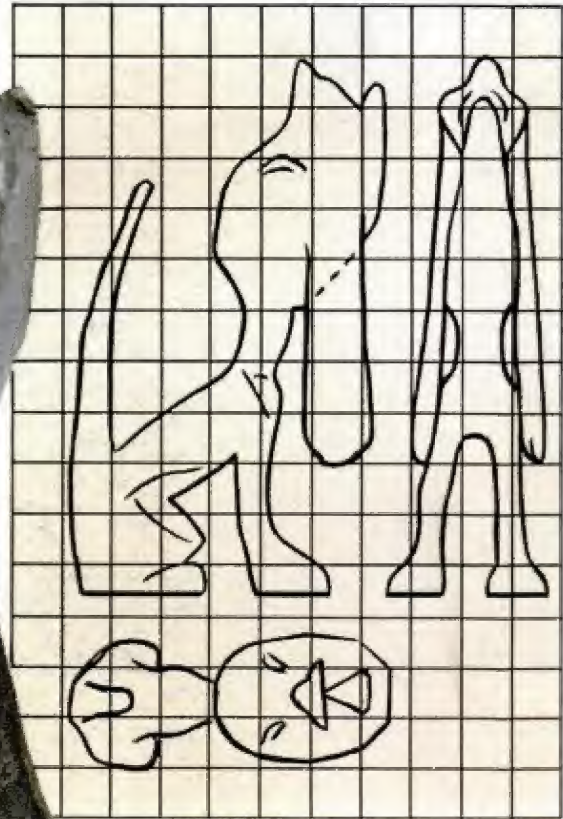


X795



WHITTLER'S PETS

Have fun whittling these figures with a pocket knife



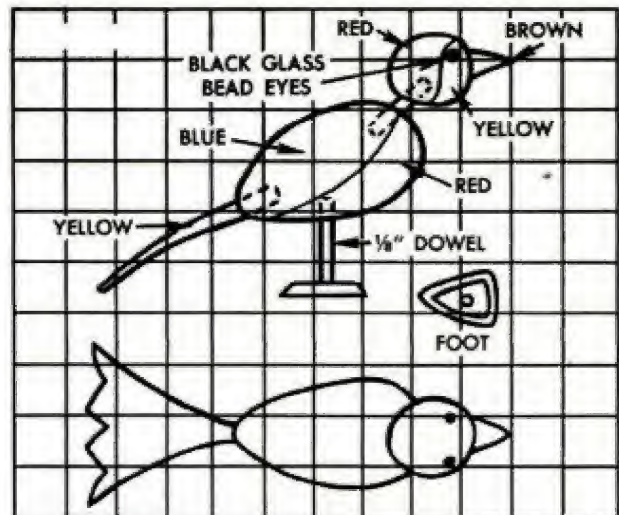
FOR WHITTLING use narrowest blade of your knife and hone to a razor edge. Lay out hound pattern on $\frac{3}{8}$ -in. squares

WHEN YOU FIRST try this kind of whittling you're in for a surprise. Notice how strongly the comic character and individuality of these whittler's subjects have been brought out by just a few short, 45-degree knife cuts on the square corners of a jig-sawed profile. You lay out a pattern on $\frac{3}{8}$ or $\frac{1}{2}$ -in. squares, using the cross-hatched profiles of any of the figures pictured, place the pattern on a piece of $1\frac{1}{8}$ -in. clear white pine, trace it and saw on the lines. Then take successive short knife cuts on the corners and note how your cutout begins to take on the form and character of a likeness almost immediately.

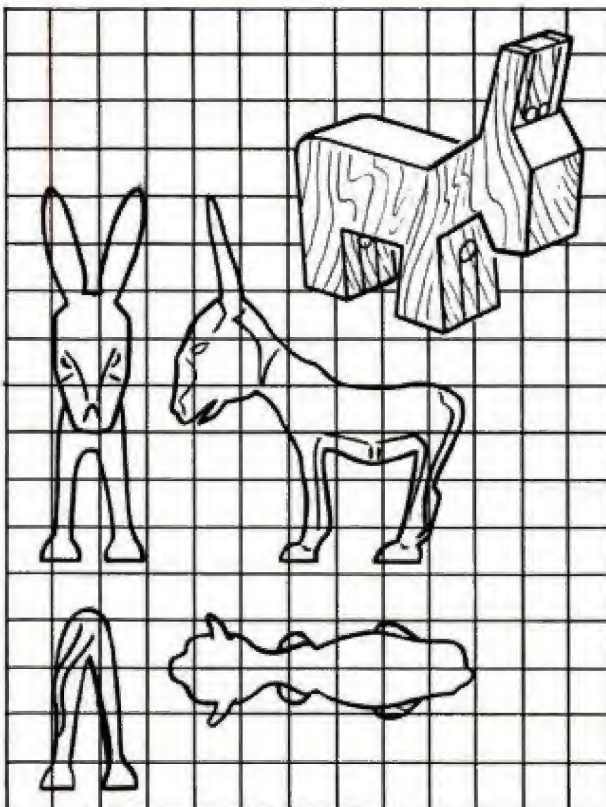
Take the skunk, lower detail on the oppo-

site page as an example. Lay out the pattern on $\frac{1}{2}$ -in. squares, and saw to the rough profile shown in the detail. Now, make light 45-degree cuts on the corners of the cutout and see how close you are to the finished figure in the photo. A couple of controlled V-cuts define the tail and body, three light curved cuts form the head and ears, two V-cuts separate the legs, and there you are.

The burro and hound take much the same procedure, except that you drill holes at the high point between the legs and ears and saw out the waste. On the hound, V-cuts form the haunches and toes and you have to pare down the tail to proportion from the profile block. The body and head of the bird are somewhat different, but the procedure is still the same; you simply round over the corners of the cutouts until the widening series of cuts meet at the center lines. Colors can be anything that suits your fancy, a few spots on the hound, an over-all color on the burro, and a white streak on the skunk.—Hi Sibley



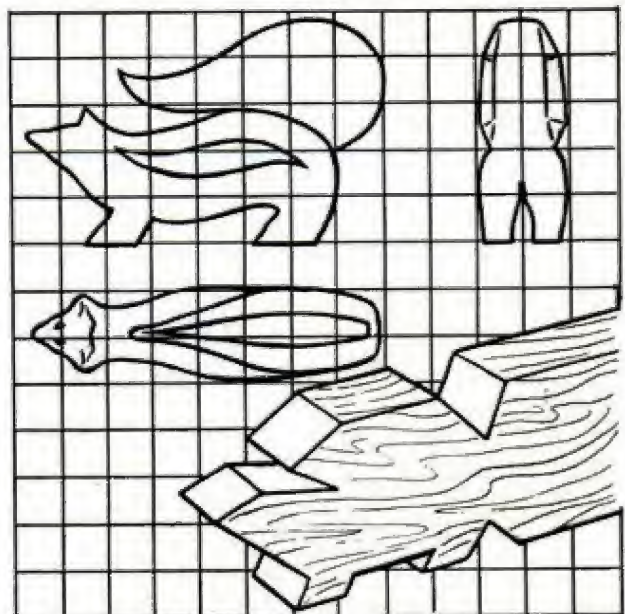
BIRD can be whittled in either pose, or stance. Procedures are the same. Simply change angle of legs



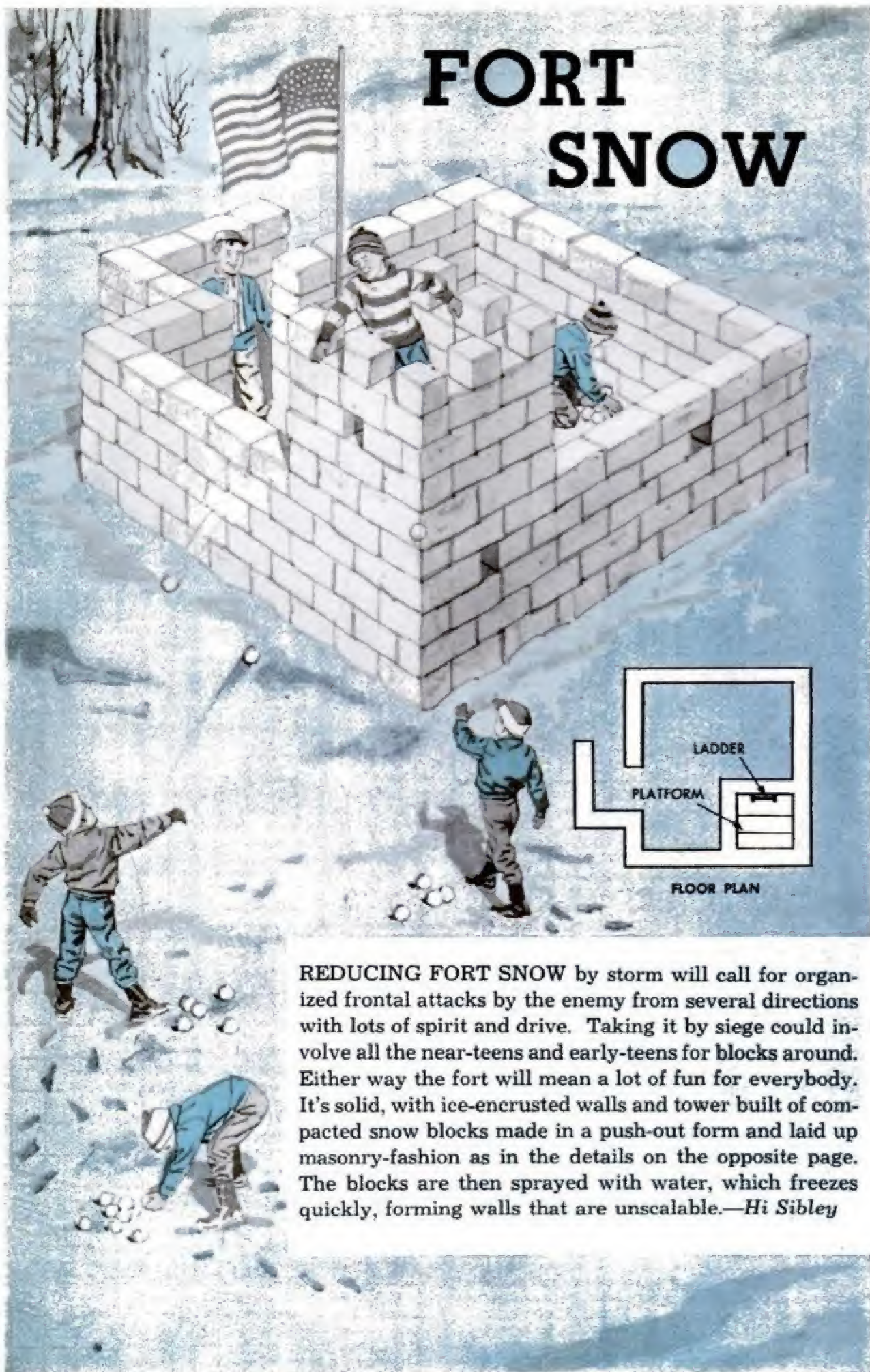
BURRO PATTERN is laid out on $\frac{1}{2}$ -in. squares. Drill holes and pare out waste to separate ears and legs



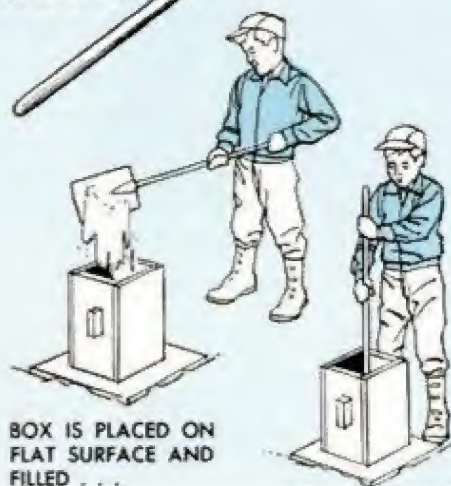
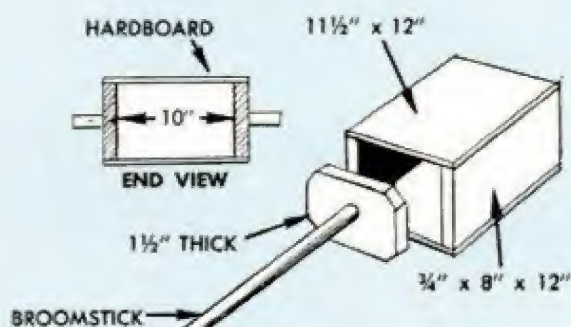
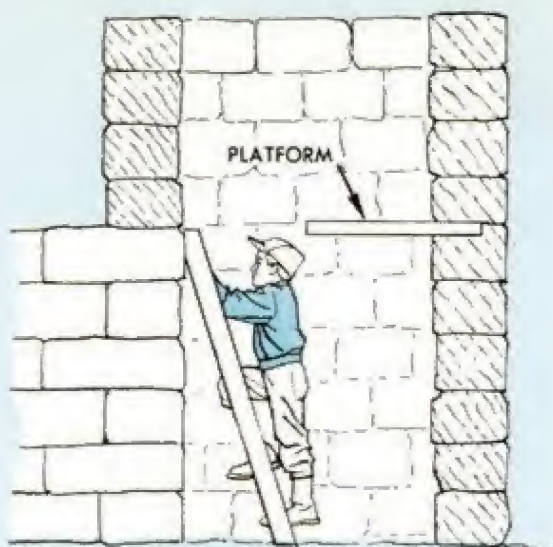
SKUNK is perhaps simplest of all to whittle. Easy paring cuts and controlled V-cuts form the contours



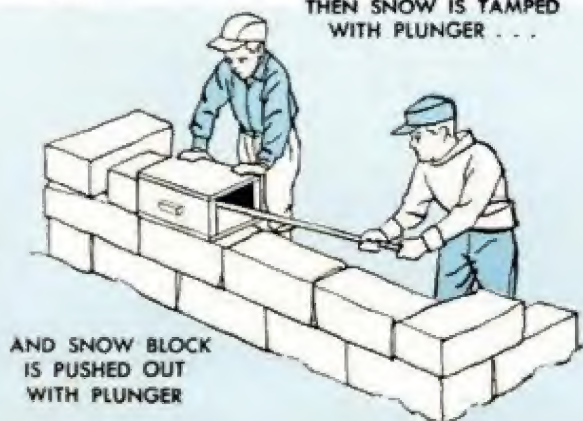
FORT SNOW



REDUCING FORT SNOW by storm will call for organized frontal attacks by the enemy from several directions with lots of spirit and drive. Taking it by siege could involve all the near-teens and early-teens for blocks around. Either way the fort will mean a lot of fun for everybody. It's solid, with ice-encrusted walls and tower built of compacted snow blocks made in a push-out form and laid up masonry-fashion as in the details on the opposite page. The blocks are then sprayed with water, which freezes quickly, forming walls that are unscalable.—*Hi Sibley*



THEN SNOW IS TAMPED WITH PLUNGER . . .



Shoe-Polish Ink

Corrections and additions on blueprints are easily made with white liquid shoe polish instead of blueprint ink, whenever the latter is unavailable. White polish also makes an ideal ink for writing on the dark areas of photographs or on other dark surfaces. Regular penpoint may be used as a printing and ruling point for line work. On larger areas, a brush is an advantage.

Nuts and Bolts Chart

Owners doing repair and maintenance work on their cars will find a chart, listing the sizes of bolts and nuts commonly used, eliminates need for trial and error when choosing the proper size wrench. The chart, which might also list the proper torque for such fittings, is glued on the inside cover of the box. Pasted over the chart, a sheet of cellophane helps protect it.—R. Hanscom



Solving

HOME PROBLEMS

STAINS made by coffee or tea on the inside of plastic dinner cups will vanish in an instant if you rub them vigorously with a little silver polish on a soft cloth



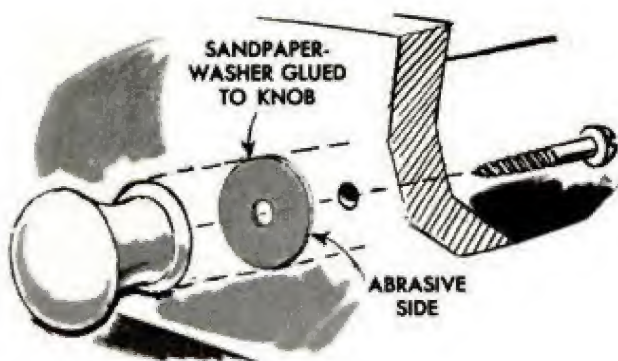
STORM DOORS which are difficult to open or close because of air pressure can be vented with a valve cut from an inner tube

RUBBER GLOVES will always be within your wife's reach when she needs them if you glue a spring clothespin to the door or an inner wall of the sink cabinet

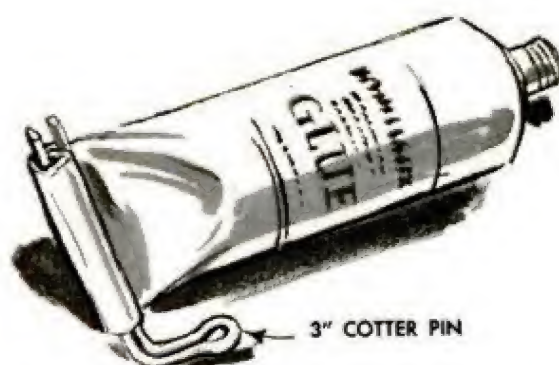


EXTRA SHELF SPACE to hold small items such as cups, saucers and condiments can be obtained by suspending shelves of 1/4-in. tempered hardboard on long L-hooks between widely spaced shelves of your cabinets. Paint shelf to match cabinet interior





DRAWER PULLS and the handles of cabinet doors that work loose will hold tightly if you insert a sandpaper washer between the handle and face of the drawer. Glue the washer in place, then tighten screw



COLLAPSIBLE TUBES of glue, shaving cream, tooth paste, etc., can be emptied completely by using a crank made from a 3-in. cotter pin. Bend the head as shown above. Remove and reuse when tube is empty



HUNTING BOOTS will last longer if properly dried after each wearing. A reusable cloth bag of calcium chloride tossed into each boot will do the trick



THREAD DISPENSER is easily made by cutting a short slit in one side of a plastic pill bottle. Thread will be kept clean, free of tangles and ready for use

WASTED SPACE at the bottom of your closet can be converted into extra storage space if you construct a simple boxlike frame to hold a storage drawer





WORTH REMEMBERING

Snow-Shovel Skid

Here's the easy way to get your trash can over the snow to the curb without straining your back. Bend a length of heavy wire into the shape shown so that it may be attached to the handles of the can to serve as a bail. Drive a screw hook into the handle of your snow shovel to engage the loop in the bail and prevent the can from sliding. By keeping the handle low the shovel can be used to skid heavy loads.

—G. E. Hendrickson



The Right Angle

It's easy to make an angle gauge from two 6-in. rules which have tapered wire-gauge slots. Simply fit a small bolt through the large ends of the slots so that the rules can be clamped together. A small lock washer fitted under the nut will provide sufficient tension to retain a setting. If you don't have such slotted rules, solid rules can be drilled to accommodate the bolt. The angle gauge can be used for regular measuring work by closing the two rules together.—R. Hanscom



Pie-Tin Reel

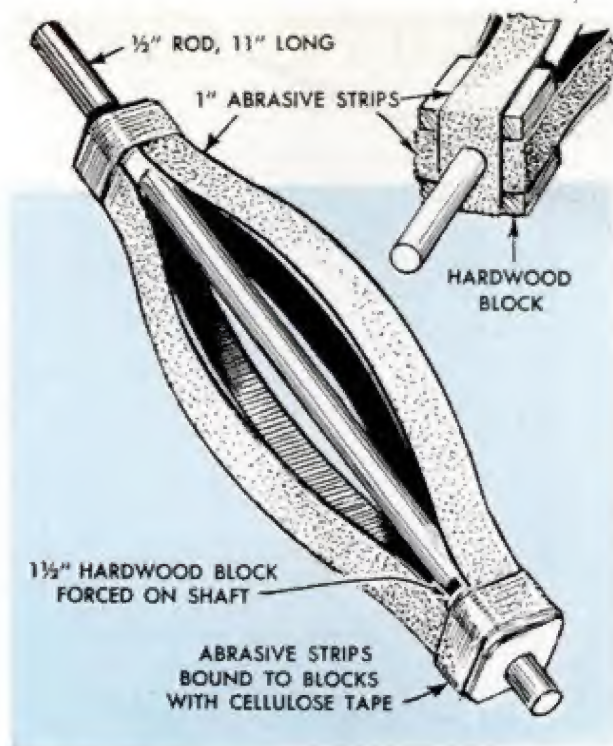
If you've been storing your trouble light by looping the cord tightly and hanging it from the nearest handy nail, try using this pie-tin reel which holds the cord in regular loops and protects the bulb. Drill a hole near the rim of a metal pie tin or an old shallow kitchen pan. Screw or nail the pan to the garage or basement wall, making sure that the hole in the rim is at the top. The sides of the pan hold the cord loops, and the lamp guard is hung by its hook from the hole in the rim.—Bil Toman

❏ A large earthenware flower pot makes an efficient and inexpensive hibachi. Just line the pot with aluminum foil and add a small round grill purchased at the dime store.



Duckboard Shoe Shelf

Your bedroom closet will take on a neater look and be much easier to clean if you keep shoes off the floor. Not only do they gather dust and have little chance for airing, but must all be removed when running a dust mop in the closet. A simple solution is to place the shoes on a duckboard shelf supported 10 in. or so off the floor. This is nothing more than slat affair, consisting of $\frac{3}{4}$ x 1-in. strips spaced $\frac{1}{2}$ in. apart and nailed to end cleats. Toggle bolts hold the shelf.—Edward J. Kolb



Hole Sander Makes Like an Egg Beater

If you have ever tried to sand a large-diameter hole in wood of any common thickness, you know what a tricky, time-consuming job it can be. Especially if you're particular about the edges being sharp and the walls of the hole smooth all the way around. Here's the centrifugal sanding

head, roller, eggbeater, or what have you, that will do it in a few seconds. The detail shows how to make it for sanding a 2 to 2 1/2-in. hole but it can be made smaller or larger, using a 1/2-in. steel rod to fit the drill-press chuck. Run the drill press at the third-step speed.—*John J. Maendel*

In-Line Sander

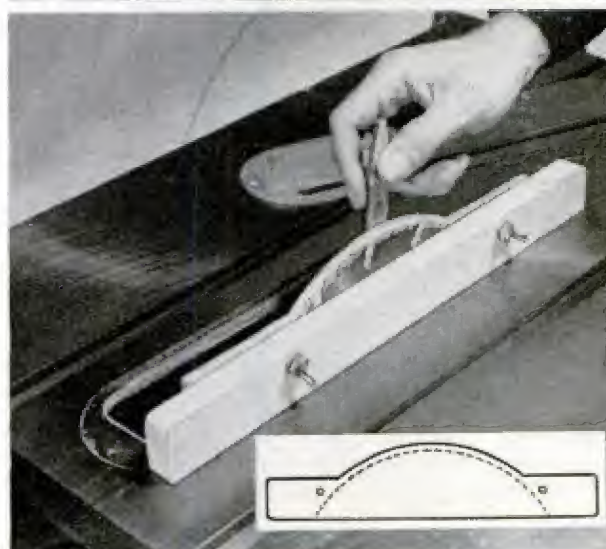
Sanding out the tiny ridges and hollows in a straight wood turning can be done, of course, by looping a strip of sandpaper around the work. A faster way is to thumb-tack the strip of sandpaper to a square of wood and slide the abrasive side along the tubing in the manner pictured, using the tool rest as a support. This method smooths out all irregularities in a few passes of the sander. Set the tool rest so that its edge just clears the work.—*J. C. Roby*



Blade Clamp

If you should happen to tighten the arbor nut a trifle too tight or if the saw blade should jam in a cut, the nut may be difficult to remove. If this happens take time to make this blade clamp. It consists of a strip of plywood with one edge cut straight and a portion of the other sawed to a radius slightly greater than that of the blade. The clamping strip is ripped from solid stock to a width of about 1 1/2 in. and cut to a length that will span the insert opening. Drill two holes through both pieces for 1/4-in. stove bolts and provide wing nuts and washers.

—*R. Hanscom*



HOME FITNESS GYM

Conclusion

YOUR FAMILY FITNESS GYM won't be complete without the old standby — the belt massager. A ten-minute workout after a hard day at the office will make you feel like a new man, completely relaxed. Tired muscles will give way to its soothing massaging action and before long you'll wind up with a trimmer and healthier figure.

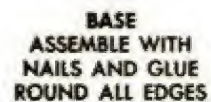
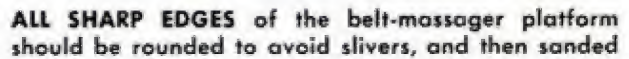
Like the bike exerciser and the rowing machine which were described last month, the belt massager is made of common, easily obtained parts. The important thing in a belt massager is sturdiness, it has to be

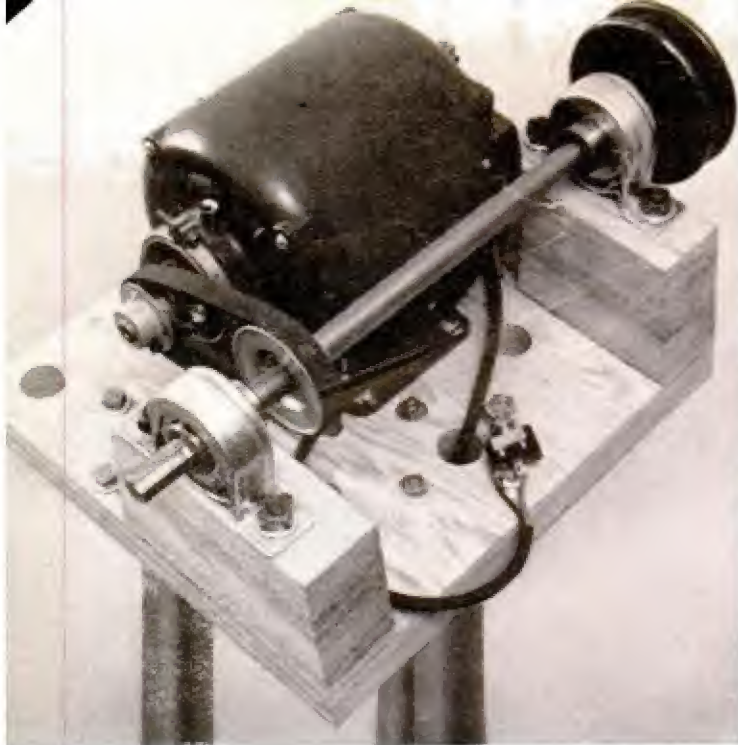


Designed by Manly Banister

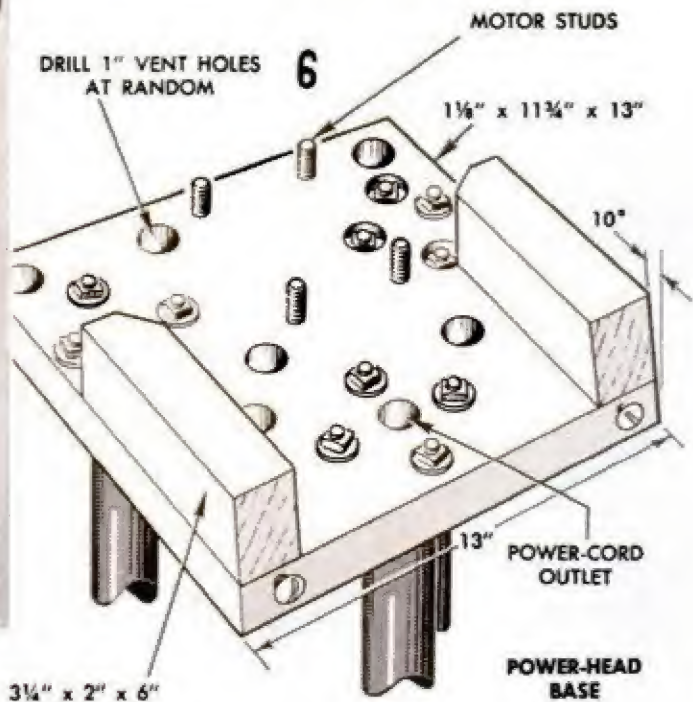
The motor pedestal consists of three 27-in. lengths of 1¼-in. steel pipe fitted with heavy-duty flanges. All three pipes are cut exactly the same length and threaded farther than normal to let the pipes seat deep in the flanges and be even with the bottom. The lower flanges are solidly an-

The motor pedestal consists of three 27-in. lengths of 1¼-in. steel pipe fitted with heavy-duty flanges. All three pipes are cut exactly the same length and threaded farther than normal to let the pipes seat deep in the flanges and be even with the bottom. The lower flanges are solidly an-





THIS IS THE POWER HEAD with hood removed. Note how motor cord runs through pipe pedestal



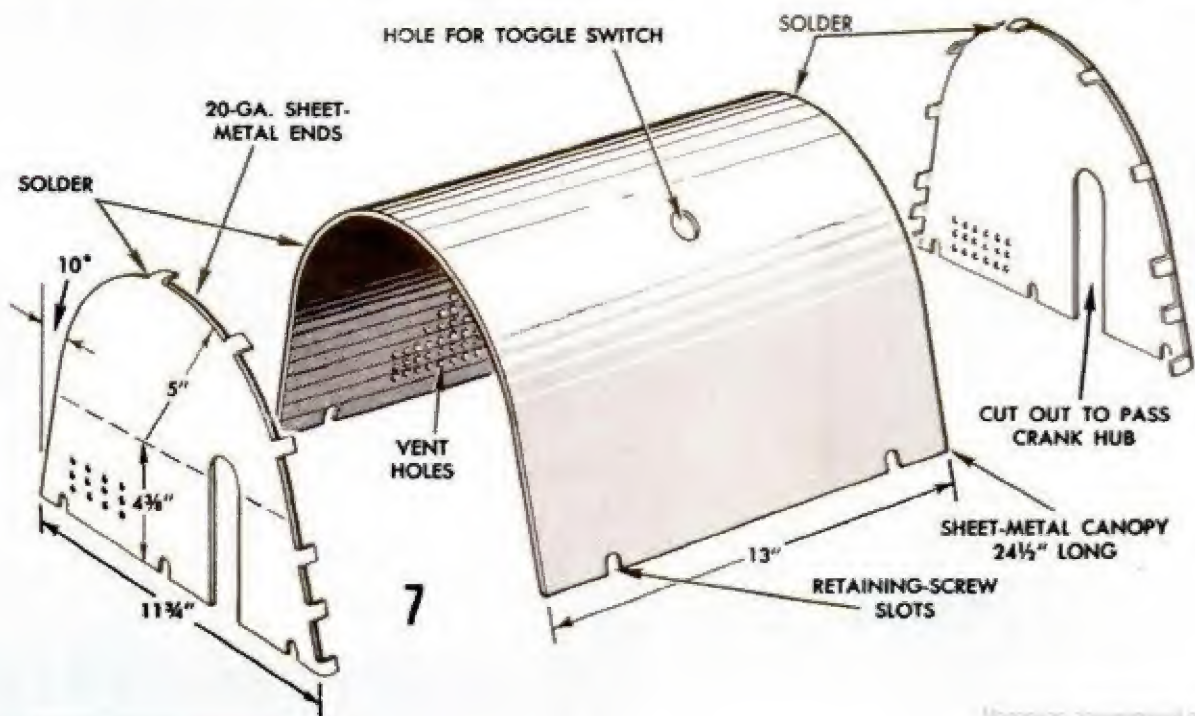
chored to 1-in. oak pads glued and screwed to the rear of the platform as shown in the plan view, Fig. 4. Note that the two rear flanges are located 9 in. center to center. The third flange is centered between the two and 5 in. forward, center to center. All three flanges are anchored securely with $\frac{1}{4}$ x 3-in. flathead stove bolts which pass through both the oak pads and the plywood. Use lock washers under the nuts. Bolts

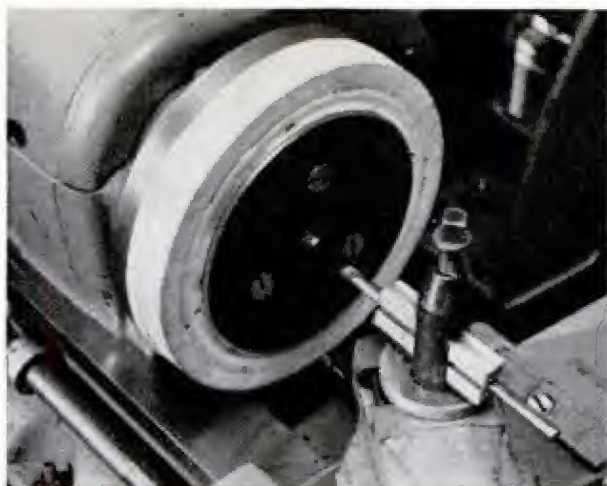
cannot be used in the rear holes of the rear flanges because of the 2 x 2 member. Husky wood screws are used here instead. Note that the front flange is mounted over a 1-in. hole drilled through the platform which permits the power cord to pass up through the pipe.

Fig. 6 details the wooden motor platform of the power head, and the photo at the left of Fig. 6 shows how the motor is belted to a crankshaft turning in pillow-block bearings. Any used $\frac{1}{4}$ -hp. (1750 r.p.m.) washing-machine motor will do and it in turn will determine the over-all size of the motor platform. Like the lower platform, the motor platform is made of $1\frac{1}{8}$ -in. plywood. After seeing that the flanges on the upper ends of the pipe columns are all turned down to precisely the same level,

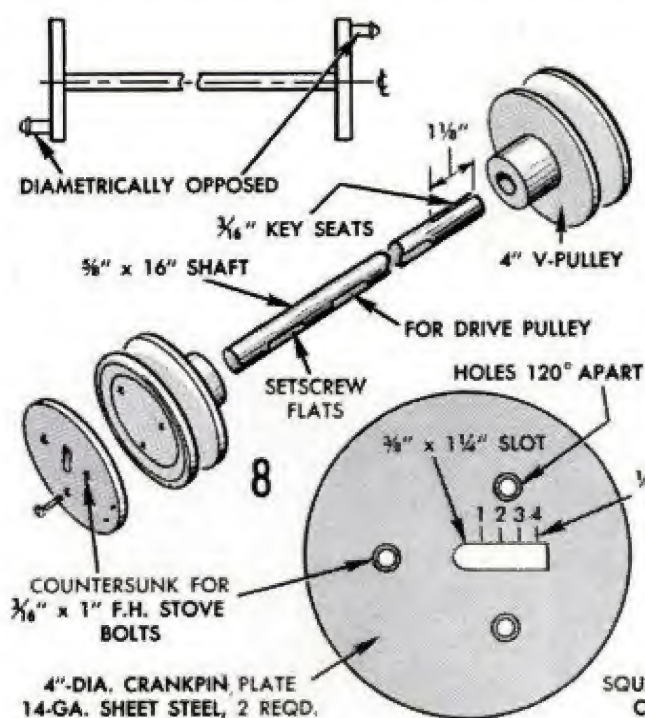
PLANS AVAILABLE

To fulfill requests for plans for building this home exercising equipment after the magazine article is out of print, we have prepared a set of large-size plans, plus an instruction booklet which may be purchased by writing Popular Mechanics Magazine, Blueprint Dept., 200 East Ontario St., Chicago 11, and enclosing \$2.50.

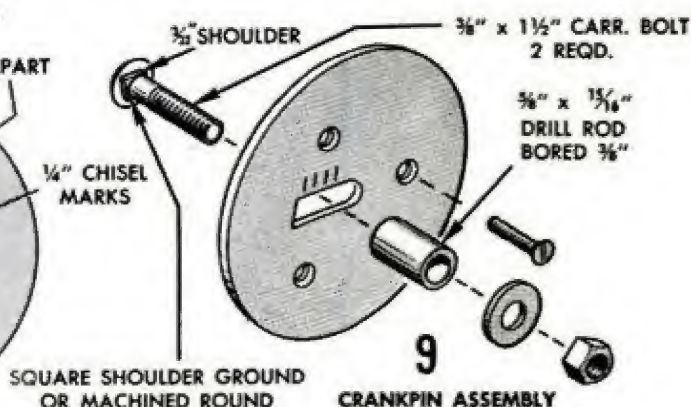




CRANKPLATES which bolt to face of V-pulleys are screwed to wood facing on faceplate and turned true



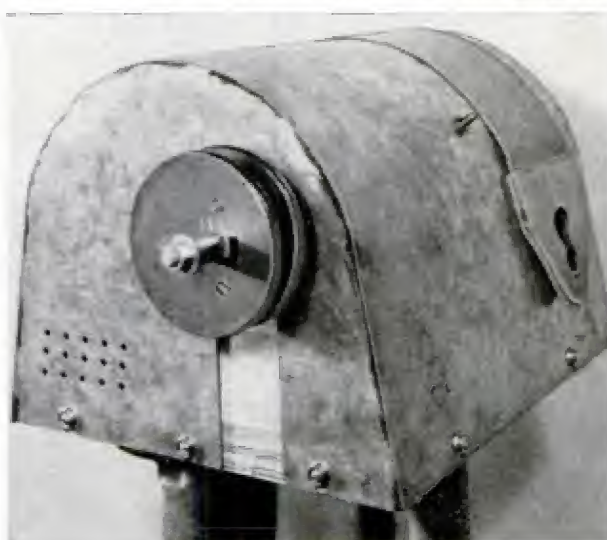
WITH SLOT ALIGNED with pulley keyway, crankplate is clamped to pulley and holes are drilled through



END COVERS of hood are neatly cut out with jigsaw fitted with metal-cutting blade. Note soldering tabs



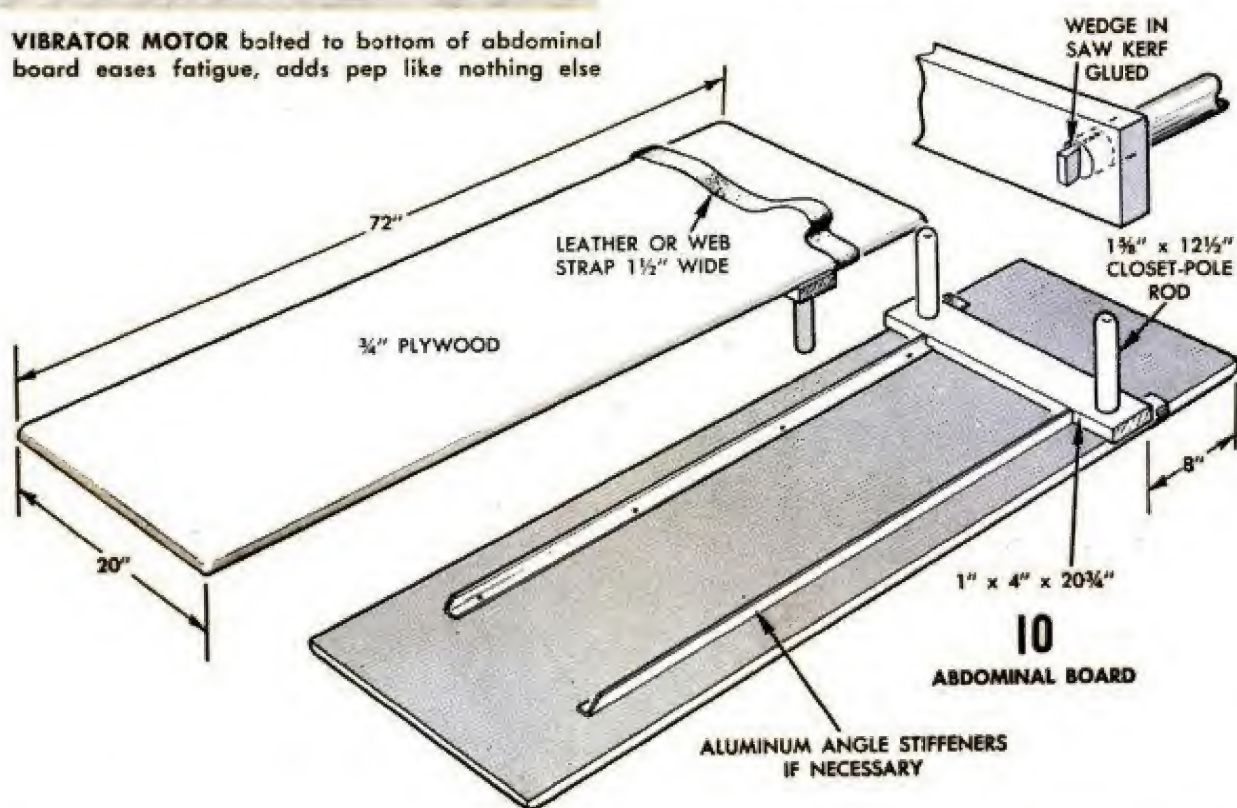
COMPLETED HOOD shows how it fits over crank heads at ends. Machine takes 64-in. massaging belt





VIBRATOR MOTOR bolted to bottom of abdominal board eases fatigue, adds pep like nothing else

place the motor platform in position on the flanges and mark the flange bolt holes. Note in Fig. 6 that holes which fall under the motor base are counterbored on the top side so as not to interfere. Bolt holes for anchoring the motor, vent holes and a hole for the power cord are all made in the wooden base before bolting it to the flanges. Oak blocks for the pillow-block bearings are added next. Holes for mounting the bearings are drilled all the way through the motor platform and $\frac{3}{8}$ -in. carriage bolts are used to anchor all three, the bearings, oak blocks and platform at one time.



The crankshaft, detailed in Fig. 8, is a length of $\frac{5}{8}$ -in. steel shafting 16 in. long. To spot the pulley-setscrew flats on the shaft, place the shaft temporarily in the bearings and at the same time slip a 2½-in. V-pulley and belt on the shaft. Place a 1½-in. V-pulley on the motor. A center-to-center spacing of 4¼ in. between the motor shaft and the crankshaft will permit a 15-in. V-belt to be used. With the same amount of shaft extending at each bearing, align the shaft pulley with the motor pulley and turn down the setscrew in the shaft pulley hard so it will mark the shaft. Do the same thing



LEG AND HIP exercises are done from a standing position, raising weights with foot at count of one, two



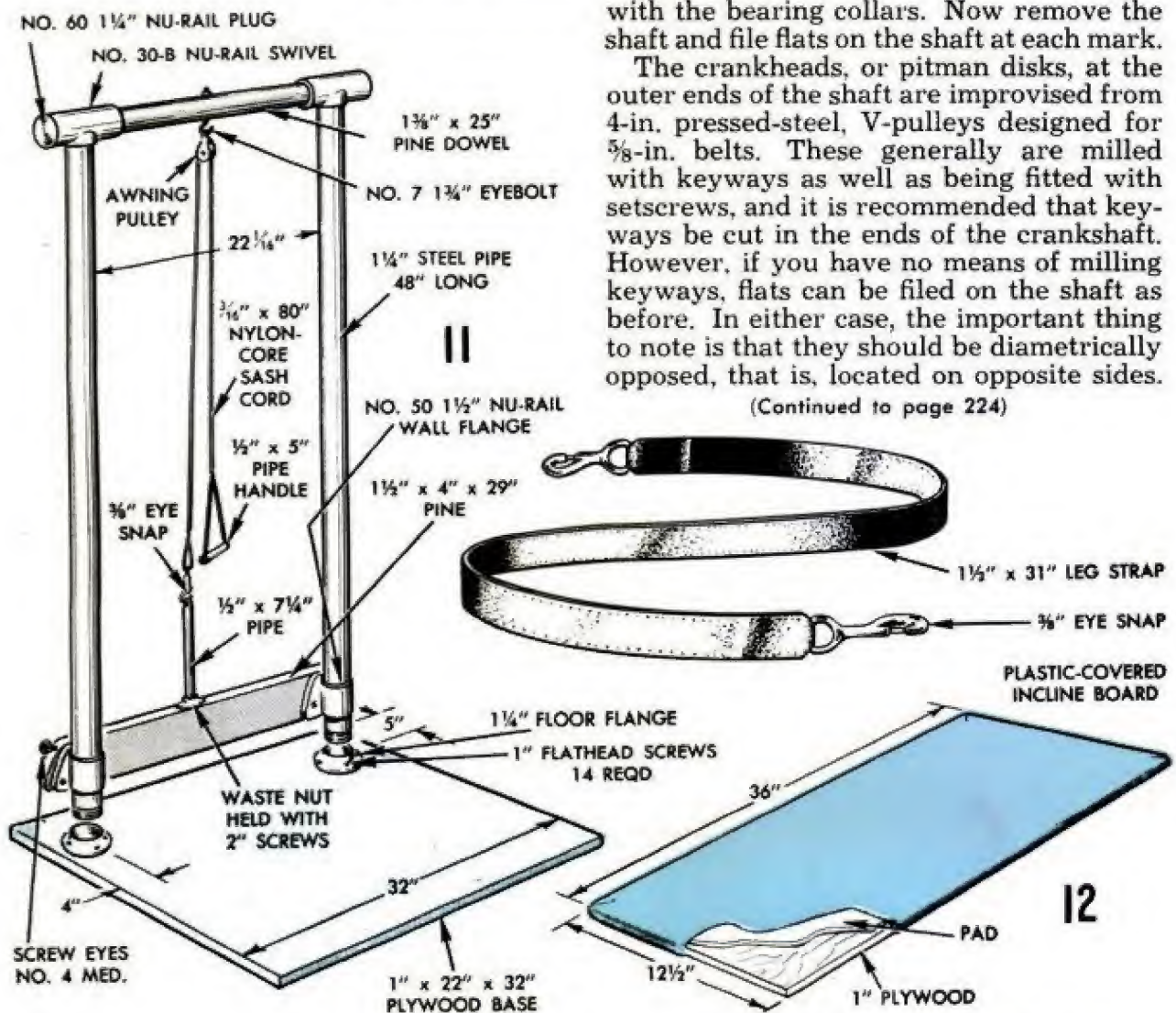
Designed by William Walker



LYING ON BACK, weighted slide bar is raised by the feet by the numbers in another helpful leg exercise



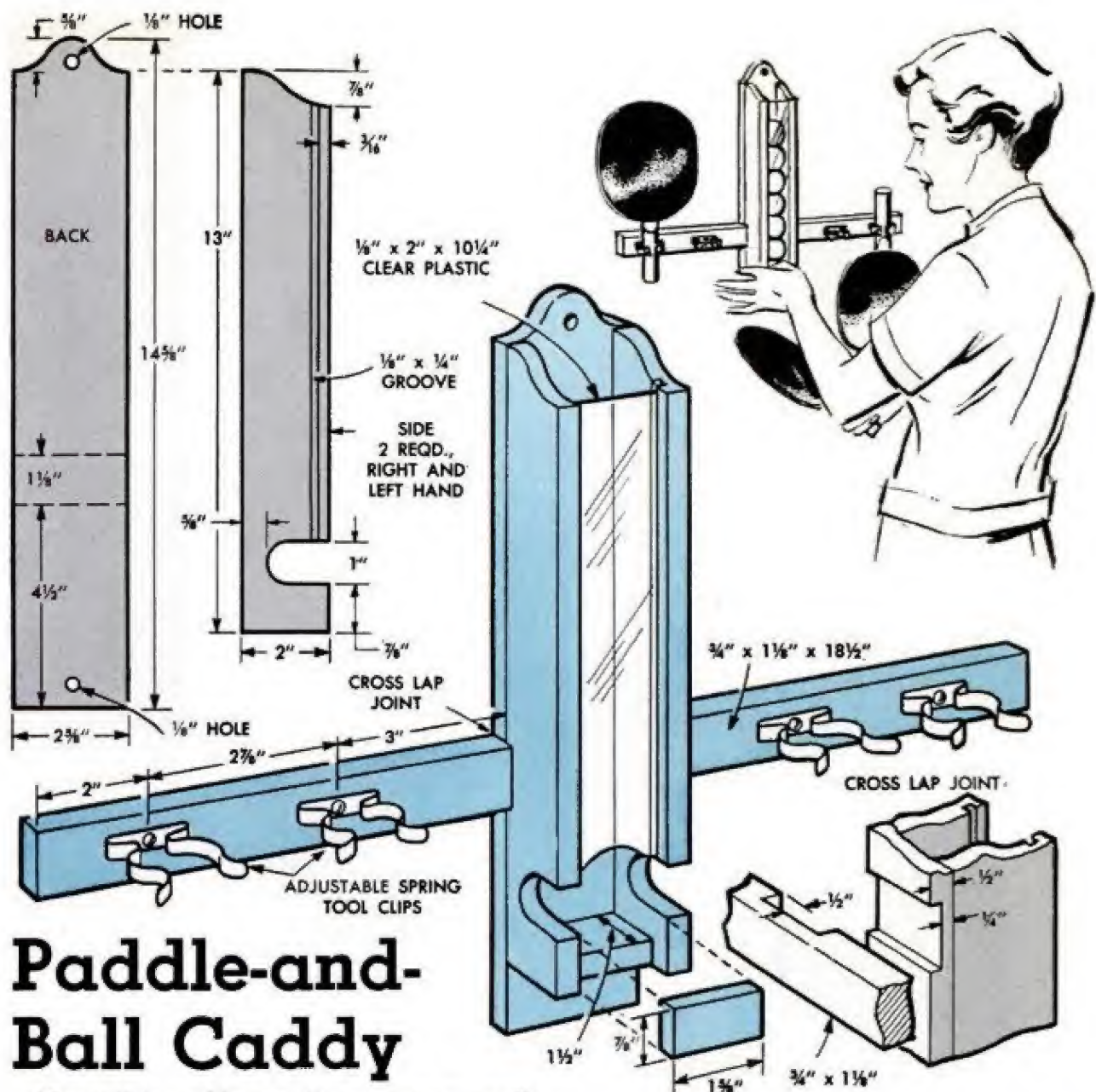
RAISING AND LOWERING body by sitting on inclined board with knees held by strap helps flatten waist



with the bearing collars. Now remove the shaft and file flats on the shaft at each mark.

The crankheads, or pitman disks, at the outer ends of the shaft are improvised from 4-in. pressed-steel, V-pulleys designed for $\frac{5}{8}$ -in. belts. These generally are milled with keyways as well as being fitted with setscrews, and it is recommended that keyways be cut in the ends of the crankshaft. However, if you have no means of milling keyways, flats can be filed on the shaft as before. In either case, the important thing to note is that they should be diametrically opposed, that is, located on opposite sides.

(Continued to page 224)



Paddle-and-Ball Caddy

Hang this caddy on the rec-room wall near the tennis table and you end that periodic search for balls and paddles. One evening's work in the shop gets out the parts ready for assembly. A second evening puts them together and finishes the caddy ready for hanging. If you use a hardwood such as

mahogany, walnut or curly maple, the caddy becomes an attractive wall decoration. As you can see, it stores and dispenses balls one at a time and the horizontal bar racks four paddles in neat array.

—Howard R. Schramm

End-Rabbeting Setup

Cheek cuts on end-rabbets should be run with the stock standing vertically against the rip fence for best results. Run the shoulder cuts first on all pieces. Then, to make the cheek cut, set the rip fence to give the exact rabbet-depth required. Screw a length of stock to the miter gauge of a width equal to or greater than the height of the fence. The right-hand end of this piece should just clear the fence, as it serves as a follower. Set the blade to the correct depth, then stand the stock on end and run the cut as pictured.—Jackson Hand



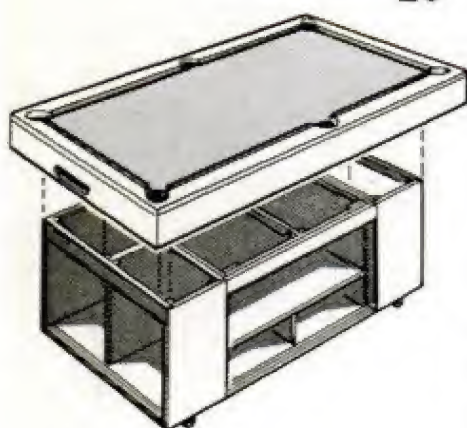
Making the Base for the Triple-Top

FUN TABLE

PART III



28



By John Jelfchak

Under-the-table space wasted in most pool tables is put to use in the form of storage compartments for chucking playing equipment and other game-room clutter

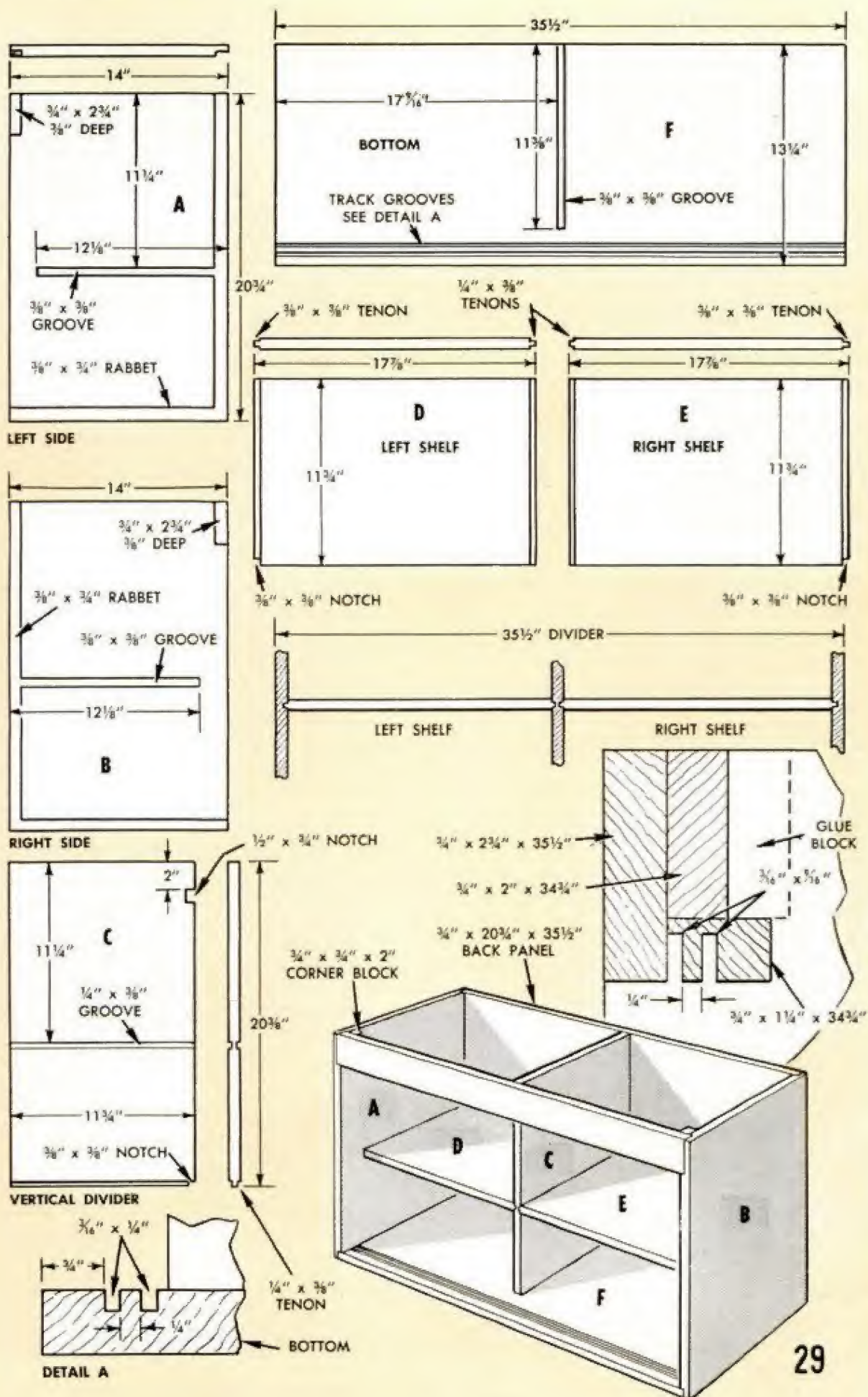
NOW THAT YOU HAVE completed the pool-table top of the fun table, construction of which was described in the December and January issues, you are ready to start building the supporting base which features roomy storage compartments for stowing the lift-off props of the model-train setup, pool and table-tennis equipment, as well as other game-room paraphernalia.

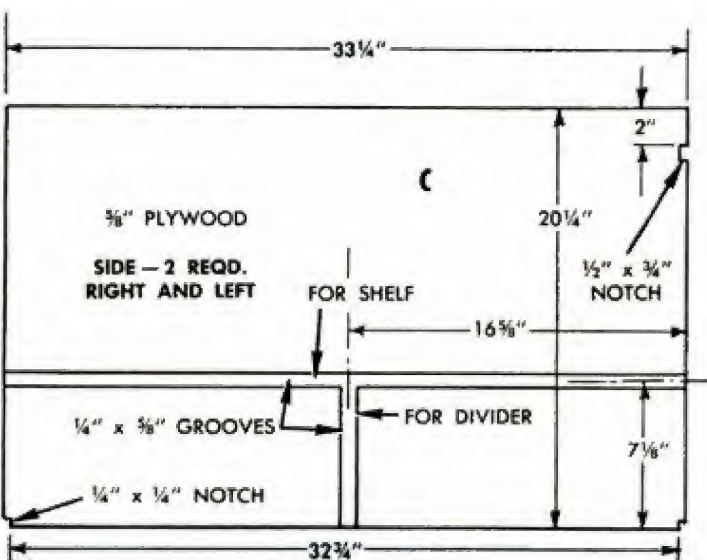
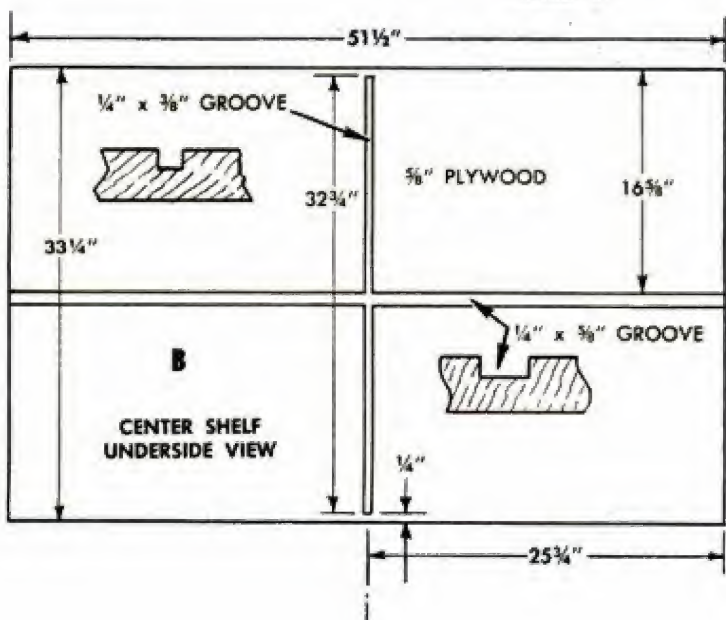
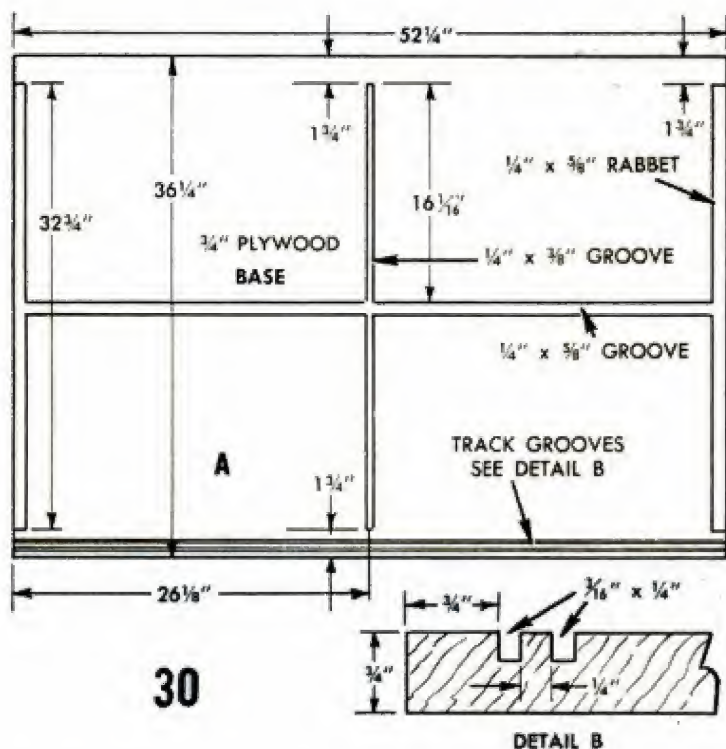
The storage unit assembly measures $20\frac{3}{4} \times 36\frac{1}{2} \times 80\frac{1}{2}$ in. and can be separated into three units for transportation, Fig. 28. The two end, or leg, cabinets are identical and serve as the legs as well as a support for the center unit. The base of the leg cabinet is $\frac{3}{4}$ -in. plywood, Fig. 29, part F, with a $\frac{3}{8}$ -in. stopped dado $11\frac{3}{8}$ in. long at the center. Run this cut on the table saw, stopping just

short of the required dimension. Finish the cut with a wood chisel. Then run $\frac{3}{16} \times \frac{1}{4}$ -in. door grooves, or tracks, 1 in. in from the front edge of the material.

The two sides, made right and left, come next. Notice that the parts A and B in Fig. 29, have $\frac{3}{8} \times \frac{3}{8} \times 11\frac{3}{8}$ -in. stopped dados and that there are $\frac{3}{8} \times \frac{3}{4}$ -in. rabbets on two edges of both pieces. The $\frac{3}{8} \times \frac{3}{4} \times 2\frac{3}{4}$ -in. corner rabbets are laid out and cut with a wood chisel.

The center divider, part C, Fig. 29, requires a dado located $11\frac{1}{4}$ in. from the top edge on both faces. Cut a $\frac{3}{8}$ -in. tongue (tenon) on the lower edge, and a $\frac{3}{8}$ -in. notch at the front edge. The $\frac{1}{2} \times \frac{3}{4}$ -in. notch near the upper front corner receives the upper track for the sliding doors. Detail A, Fig.





29, shows the lower tracks. Note that upper tracks are cut deeper. Two shelves, parts D and E, Fig. 29, have ends tenoned to fit into the dadoes in parts A, B, and C. Note the difference in tenon sizes.

The back panel requires no cutting other than the over-all size given. A front piece, or rail, forms a part of the upper sliding-door track assembly, as in the sectional view, Fig. 29. Study the drawing before making any cuts. Behind this rail is a backing strip, a grooved track and two corner blocks. Take extra care in constructing the upper grooved track since it must line up precisely with the grooves in the base. Duplicate all pieces as there are two end, or leg, units. Prime (with glue) all edge grain, apply glue over the priming, and nail. Set the nails and fill with a patching compound.

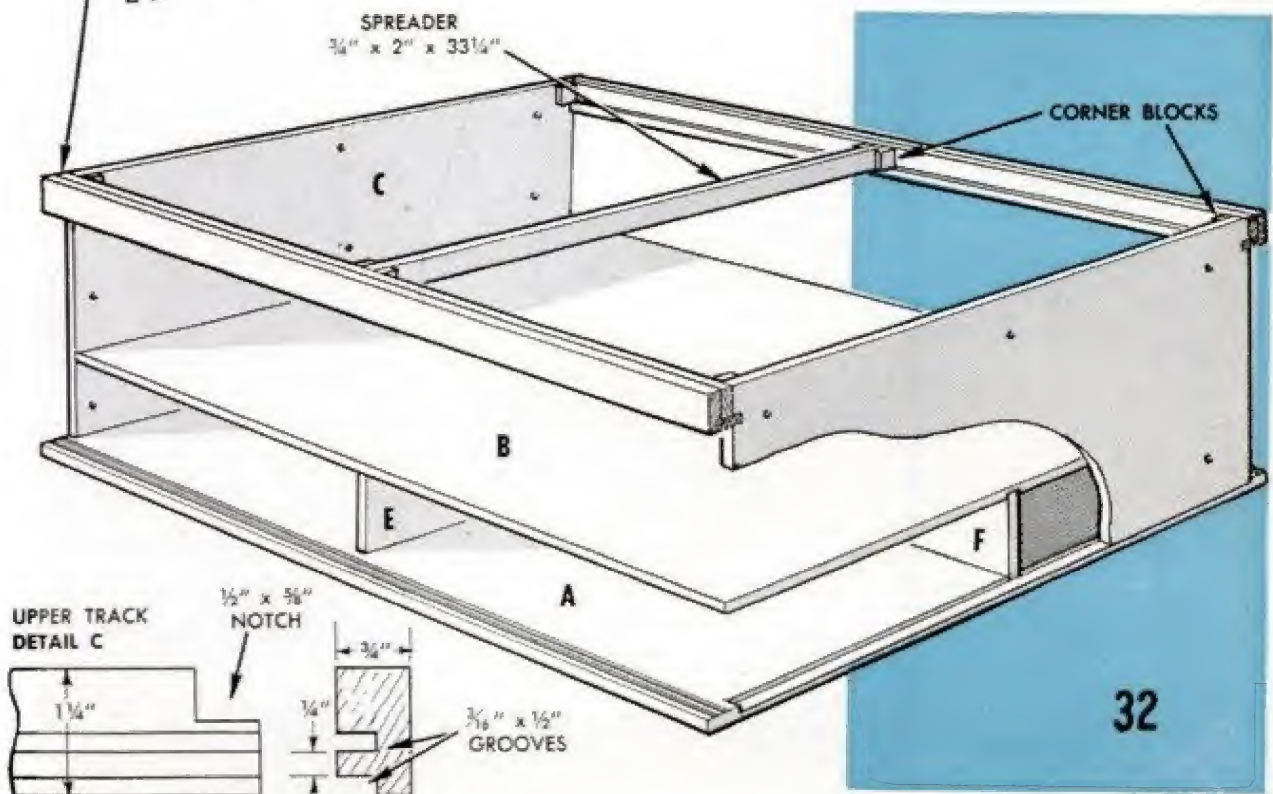
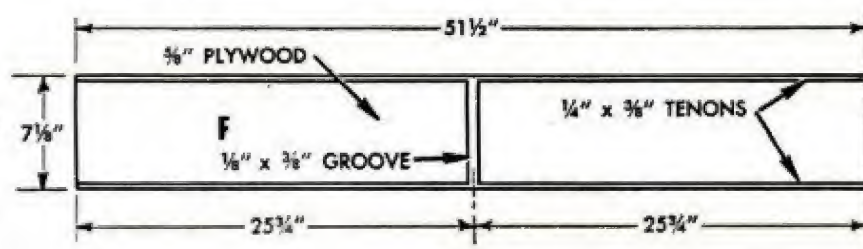
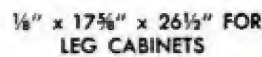
The base, shelf and end pieces of the center storage unit, parts A, B, and C, are detailed in Fig. 30 and the unit is shown assembled in Fig. 32, including the additional parts E, and F, Fig. 31. Note that only the bottom is of $\frac{3}{4}$ -in. plywood. The bottom tracks detail B, Fig. 30, are identical to those on the end cabinets. Note that two sides are required, one left and one right. The shelf dado is easy to cut on the table saw all the way but you may have to finish cutting the divider dado with a chisel. Notice the two $\frac{1}{4}$ -in. \times $\frac{1}{4}$ -in. notches in the lower corners. On the shelf the dadoes, or grooves, are centered each way; one is stopped, the other goes through to the edges.

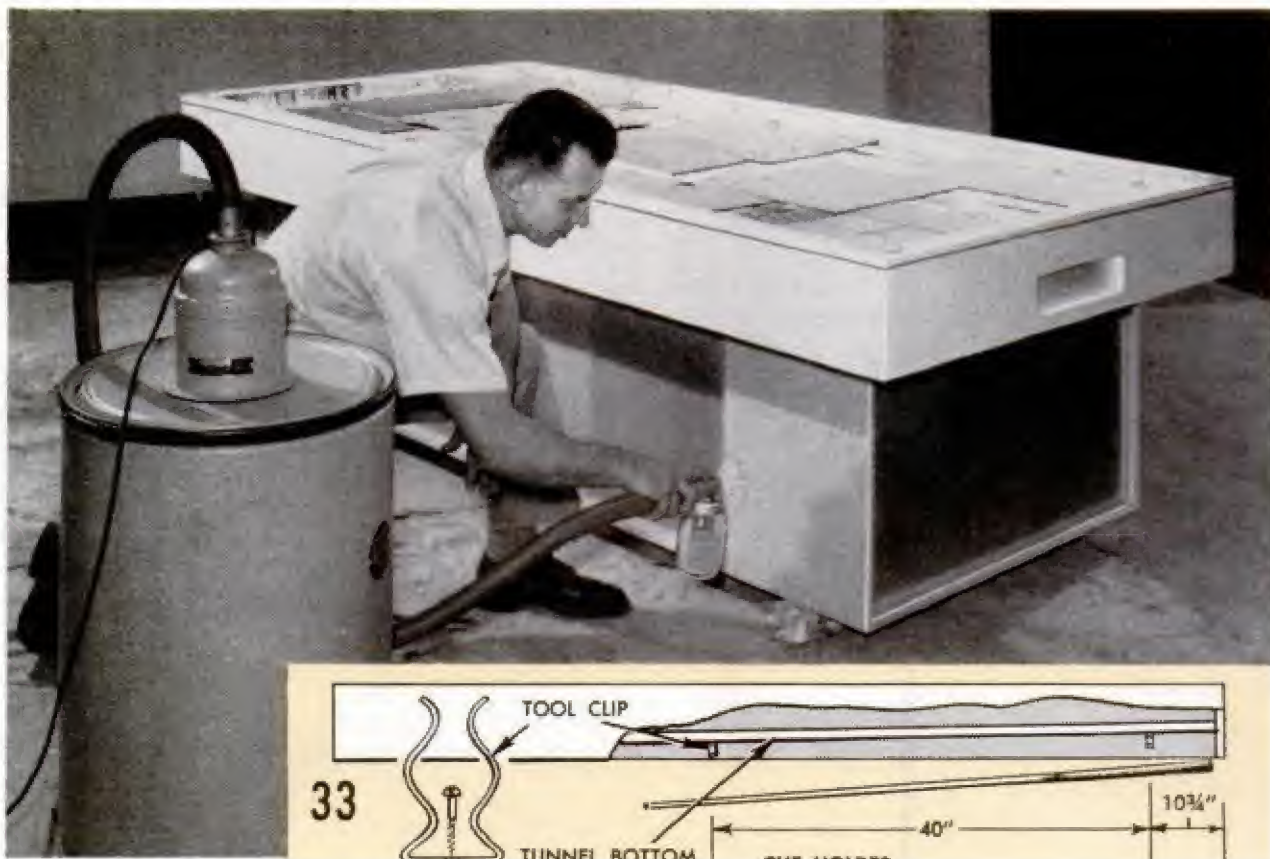
The long divider, part F, Fig. 31, is rabbeted on both edges and grooved on both sides at the center to take the inner end of the dividers, parts E, Fig. 31. Note that in the front corners of dividers E the tenons are cut back $\frac{1}{4}$ in.

Sectional dimension and assembly of the upper track, Fig. 31, will be seen in detail C, Fig. 32. This member is $52\frac{1}{4}$ in. long. Cut duplicate $\frac{3}{4} \times 2\frac{3}{4}$ -in. facing strips, and $\frac{3}{4} \times 2$ -in. backing strips. These will be assembled as in the sectional view, Fig. 31. The parts are cut from solid stock. Finally you'll need one spreader, and eight glue blocks, each $\frac{3}{4} \times \frac{1}{2} \times 2$ in.

Now, trial-fit all the parts of the three-unit base. Make any adjust-

Place the end units in position against the center cabinet, line up accurately, and clamp in position. Mark off on the inside ends of the center cabinet, and drill eight holes in each side as indicated. Counter-sink and drive 1¼-in. No. 10 F.H. wood screws—8 on each side. This results in a





PAINTING TABLE, the final operation, is done with a sprayer of the type attached to vacuum cleaner. Here shop vacuum supplies air pressure. Details shows how cues are racked to underside of ball tunnel

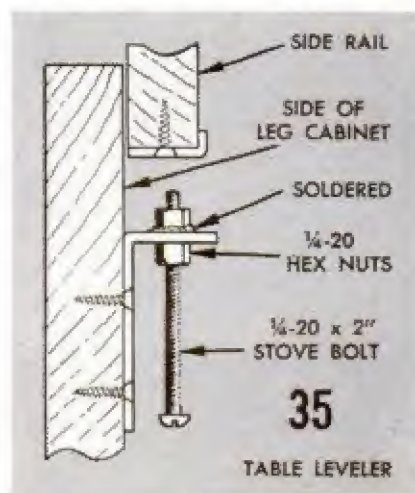
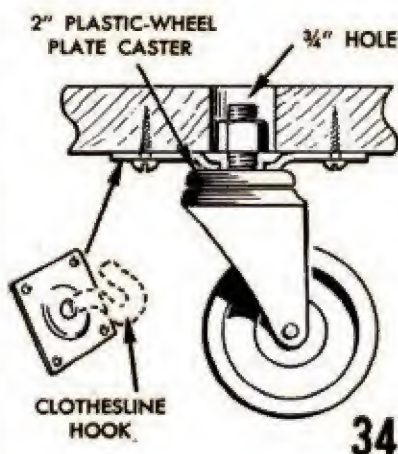


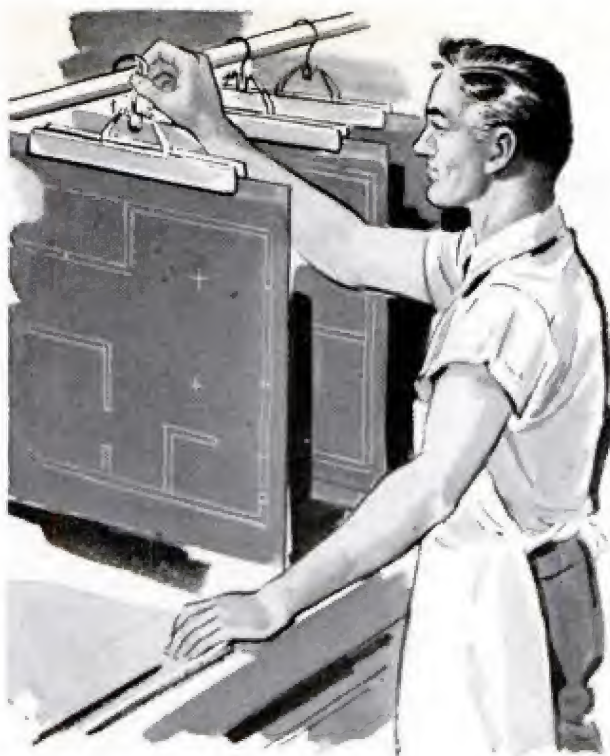
simple, rigid assembly of the three-part base. Now, to add the casters, take the three units apart, place the two end cabinets back to back, clamp together temporarily and turn the combined units over, bottom up.

The assembled table rolls on four 2-in. rubber or plastic-wheel casters (two with brakes), which are of the type fitted with a $\frac{3}{4}$ -in. threaded stud and generally used on power-tool stands. Locate longitudinal center lines on the bottom of each end cabinet. Plates for the casters are made from heavy clothesline hooks of the type having mounting plates, or bases, like those in Fig. 34. Remove the hooks. Enlarge the hole in the center of each plate to take the caster stud. Then attach the plates to the casters, drawing

(Continued to page 214)

SWIVEL CASTERS, two with brakes, are attached to leg cabinets as in photo at left and center detail. Right-hand detail shows how levelers are attached to leg cabinets. Four identical levelers are needed



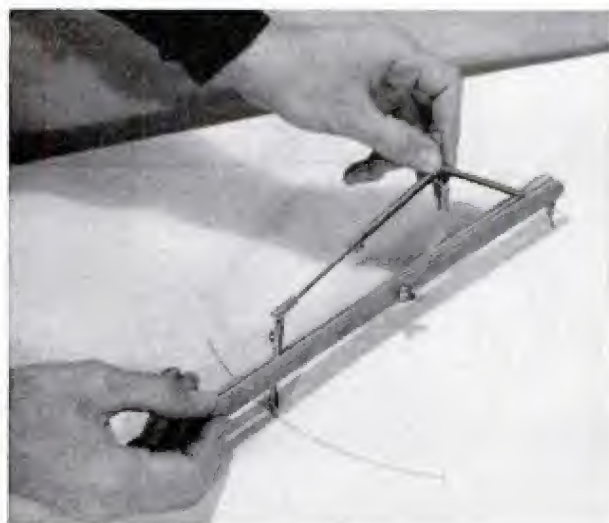


No-Roll Storage

Small blueprints, shop drawings and tracings will remain flat and dust-free indefinitely if you clamp one or more in a trouser hanger and hang on a wire or clothes-closet pole. If prints have been rolled, clamp a second trouser hanger to the bottom edges to serve as a weight.

Wandering Compass

When a draftsman's compass is fully extended it can get a little wobbly, especially if you're using the extension arm. A full circle reveals any deflection right away but you're not always sure of accuracy when drawing a segment. Clamp two $\frac{1}{4} \times \frac{1}{2}$ -in. hardwood strips to the legs with a $\frac{1}{8}$ -in. bolt and wing nut as pictured. This gives the compass all the rigidity and reliability of a trammel.—*H. Hanscom*



Label It

EXOTIC wine labels from famous vineyards throughout the world, beautifully printed in multicolors, provide an unusual touch of contemporary decoration. Most appropriate for adding a splash of color to game-room walls, bar front or snack area; labels also may be applied to ice buckets, trays, wastebaskets, table tops, etc. May be applied with glue or rubber cement. You can get 30 for \$2.00 from Heritage House, 529 Firethorn Drive, Monroeville, Pa.

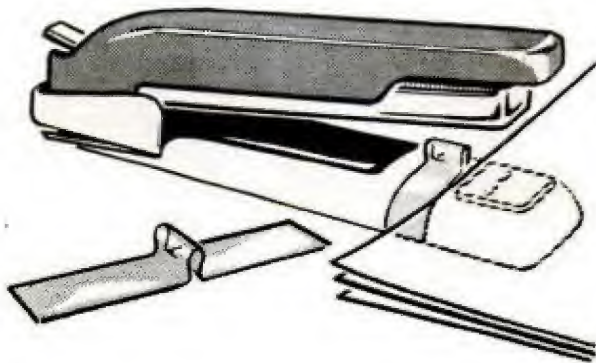




T-Square Sleeve

Students who on occasion carry a drawing board and T-square back and forth to school will find that the T-square can be carried more conveniently if slipped into a sleeve attached to the back of the board. Being nothing more than a length of lightweight cardboard folded and lapped at the seam, the sleeve interferes in no way with the regular use of the board and therefore can be permanently attached with glue or tacks. Form the sleeve by lapping the edges of the cardboard about $\frac{1}{2}$ in. and fastening with staples. In addition to keeping both T-square and board together, the sleeve also affords protection for the ruling edges of the blade.—*Richard Hanscom*

[T]o avoid marring a surface when working with a compass, try using a flat transparent plastic garment button as a pivot block. Coat the underside lightly with beeswax so it won't slip and prick-punch the face for a center.



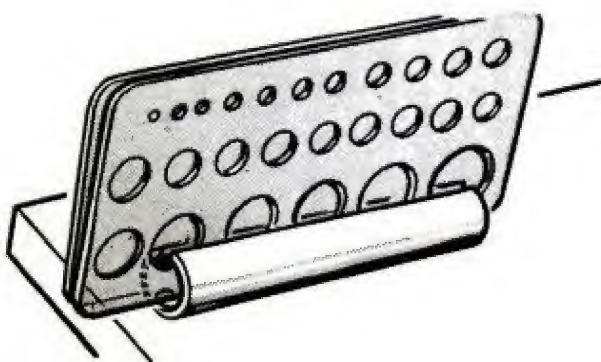
Stapler Stop

A folded strip of gummed tape attached to your desk stapler will serve as a practical depth stop when stapling papers. The upright, creased part of the tape serves as the stop and assures that all staples will be located the same distance from the edge of the paper. The stop is easily attached and can be removed when it interferes with regular use.—*G. E. Hendrickson*



Soap Shapes Brush

The chisel edge on an artist's lettering brush may be maintained by shaping the edge on a wet bar of soap before putting the brush away. The soap will dry almost immediately and hold the bristles in shape until the next job. When the brush is needed again, you need only wash the soap out with water and it is ready for use. This will work equally well with small touch-up brushes used around the home.



Tube Holds Templates

Draftsmen and artists can keep their lettering guides, templates and angles within easy reach on the drawing board by standing them in a section of mailing tube. To make it, simply cut a $\frac{1}{4}$ -in. slot lengthwise in one wall of a 6-in. piece. Use two thumbtacks to attach the holder to the drawing board, inserting one tack at each end of the tube.—*William B. Eagan*

NEW FOR SHUTTERBUGS NEW

UNIQUE PROJECTOR SCOPE makes viewing and editing movies possible without setting up a screen—even viewing in daylight is practical. Scope resembles a television picture tube. With 8-mm. scope, movies may be previewed at any time. You simply insert unit into lens opening in place of projector lens. Priced at \$14.95. Hudson Photo Industries, S. Buckhout St. & Station Rd., Irvington-on-Hudson, N. Y.



CAROUSEL SLIDE PROJECTOR features 80-slide revolving tray which can be set for continuous, automatic operation at intervals of 5, 10 or 20 sec., or for manual control. All-in-one remote-control switch permits operator to change slides, hold slides, or reverse them. Unit has continuous motorized focusing. Slides are accessible for instant editing. Less than \$140. Eastman Kodak Co., Rochester 4, N. Y.



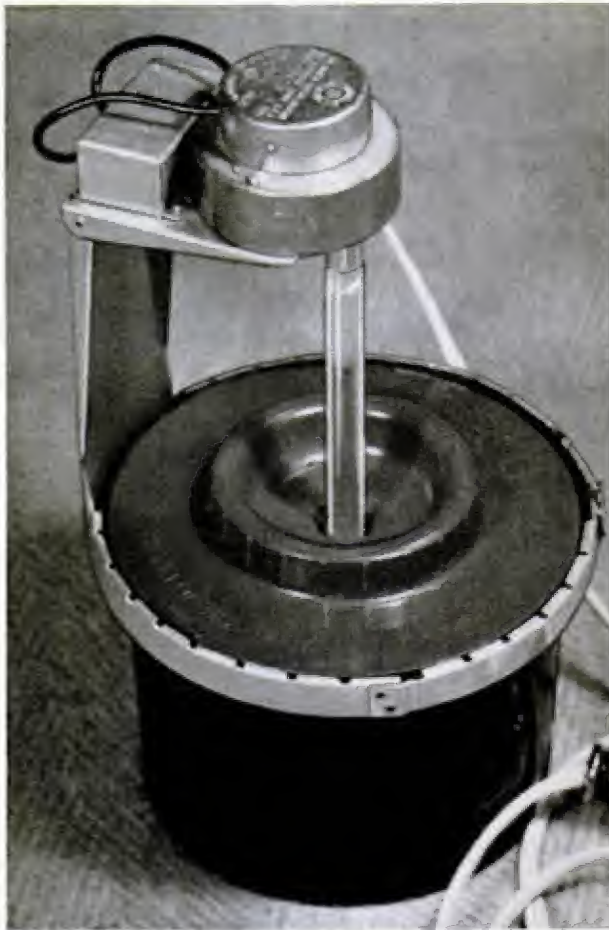
A 4-IN-1 ENLARGING EASEL provides fast, trouble-free printing in four of the most popular sizes of paper (8 x 10, 5 x 7, 4 x 5, 2½ x 3½). Magnetic latching eliminates the use of springs, but always provides positive paper holder. Nonslip rubber feet hold easel in place. Both sides of easel have white focusing base. Priced at \$8.95, easel is marketed by Photo Materials Co., 2450 Estes Ave., Elk Grove, Ill.



SLAVE FLASH UNIT is automatically fired by light from flash on camera. Weighing less than 6 oz., the lightweight, cordless flash unit permits using additional light sources with great ease. Gun may be shot up to 25 ft. from small flash units accepting midget bulbs. Mechanical safety button prevents the premature flashing by other flash guns. Price: less than \$20. Eastman Kodak Co., Rochester 4, N. Y.

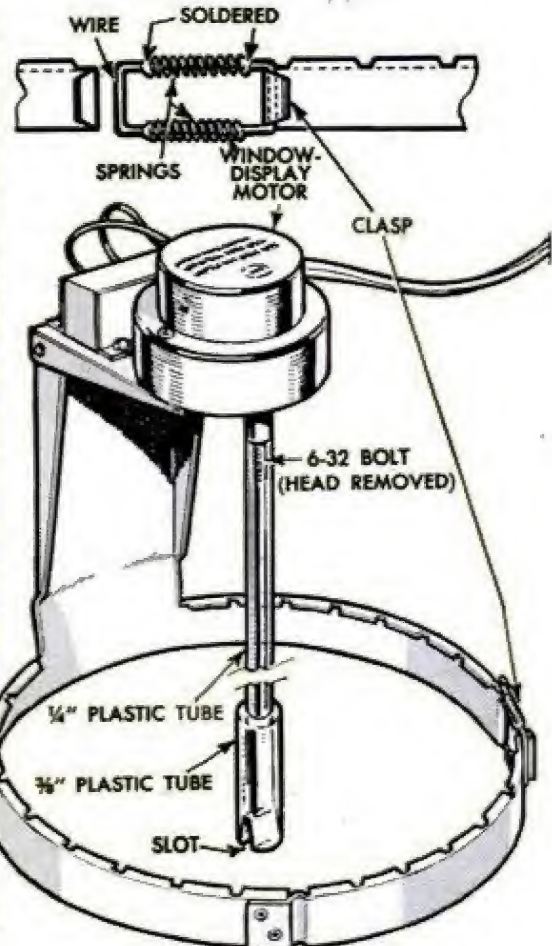
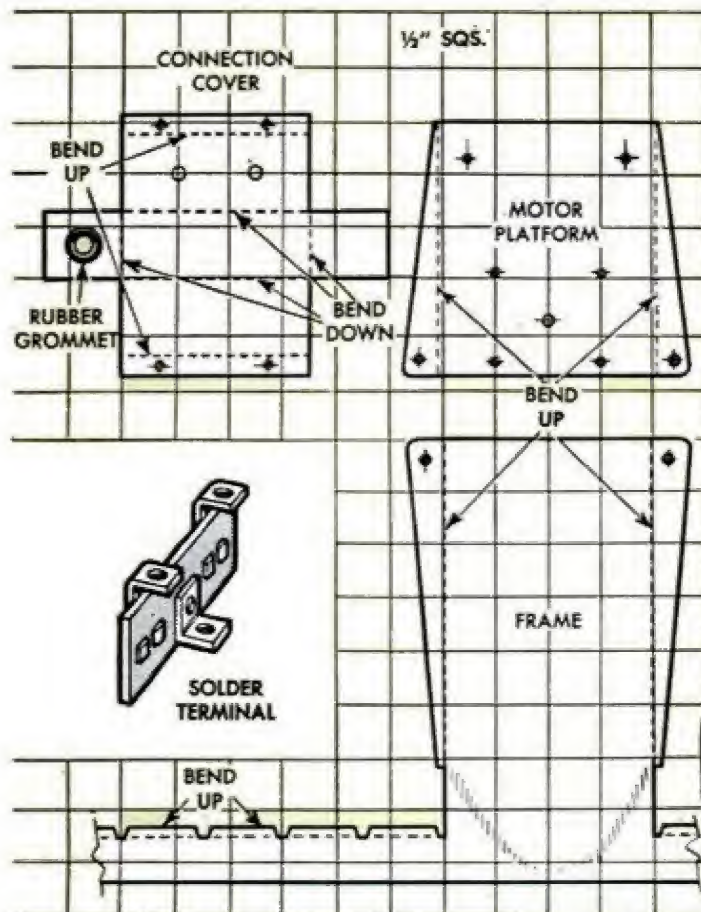


Electric Tank Agitator



Motor-support bracket clamps to developing-tank cover to hold agitating rod in line with film reel in tank

SPENDING ten to fifteen minutes manually agitating the tank each time you develop a roll of film is silly when this little electric agitator will do it for you automatically and continuously. The heart of the unit is a 10-r.p.m. advertising-display motor which slowly rotates the tank reel by a plastic-tube shaft extension coupled to the motor. This was done in the original by turning a headless machine screw part way into a hole already tapped in the end of the motor shaft and then threading the tubing over the end of the projecting screw. A tight-fitting plastic sleeve forced over the motor shaft and the tubing would be another way. A spring-tensioned sheet-metal bracket, designed to clamp around the tank cover, supports the motor and agitator shaft in line with the filler opening. Patterns, made to fit the tank at hand, are cut from sheet aluminum (such as a cookie sheet) and bent along the dotted lines. Eyelets or small machine screws can be used to fasten the motor platform to the frame. The motor and a switch-fitted cord are wired to a terminal strip.—*Ted Strader*



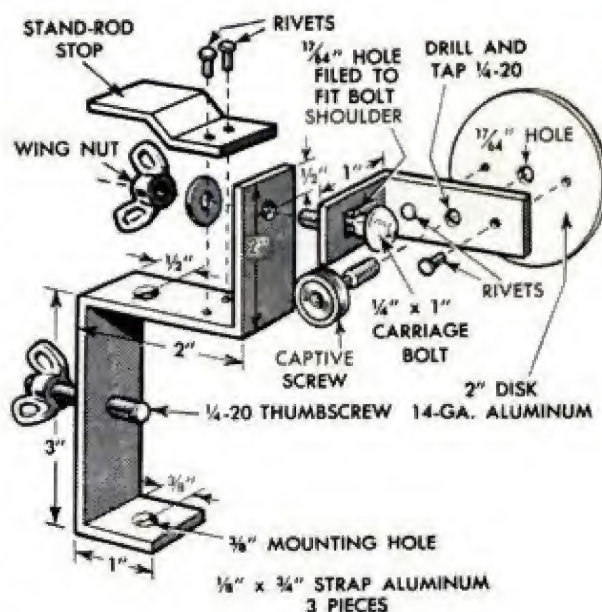
FOR CAMERA BUGS

Extension Flash Adapter

Designed to fit the terminal rod of a collapsible light stand, this universal adapter provides a flash unit with a secure base on which it can be adjusted and locked in any position. This makes it an indispensable accessory for indirect bounce, multiple and supplemental lighting. Also when you want the single main light off the camera for those unusual or dramatic pictures.

Cut three lengths of strap aluminum for each adapter; the longest is 8 in. for the stand clamp, 3 in. for the light mount and $1\frac{1}{2}$ in. for the rod stop. To make it easier, drill all the holes before bending and drill those for the rivets with the pieces clamped together to be sure the holes line up. Sharp 90-deg. bends can be made in the aluminum by clamping the parts between the jaws of a vise and tapping the metal lightly at the points of bend with a hammer. Start forming bends in the upper end of the 8-in. piece.

The captive screw, available in camera shops, is a standard-base screw which fits the tripod socket in the camera. The center hole in the aluminum disk, which provides a base for the flash unit, is drilled oversize to clear the threaded captive screw. The thumbscrew can be made from a wing nut run down and soldered to the head of a stove bolt. Finally, for appearance give it a brushed finish with a wire wheel chucked in an electric drill.—*Manly Banister*

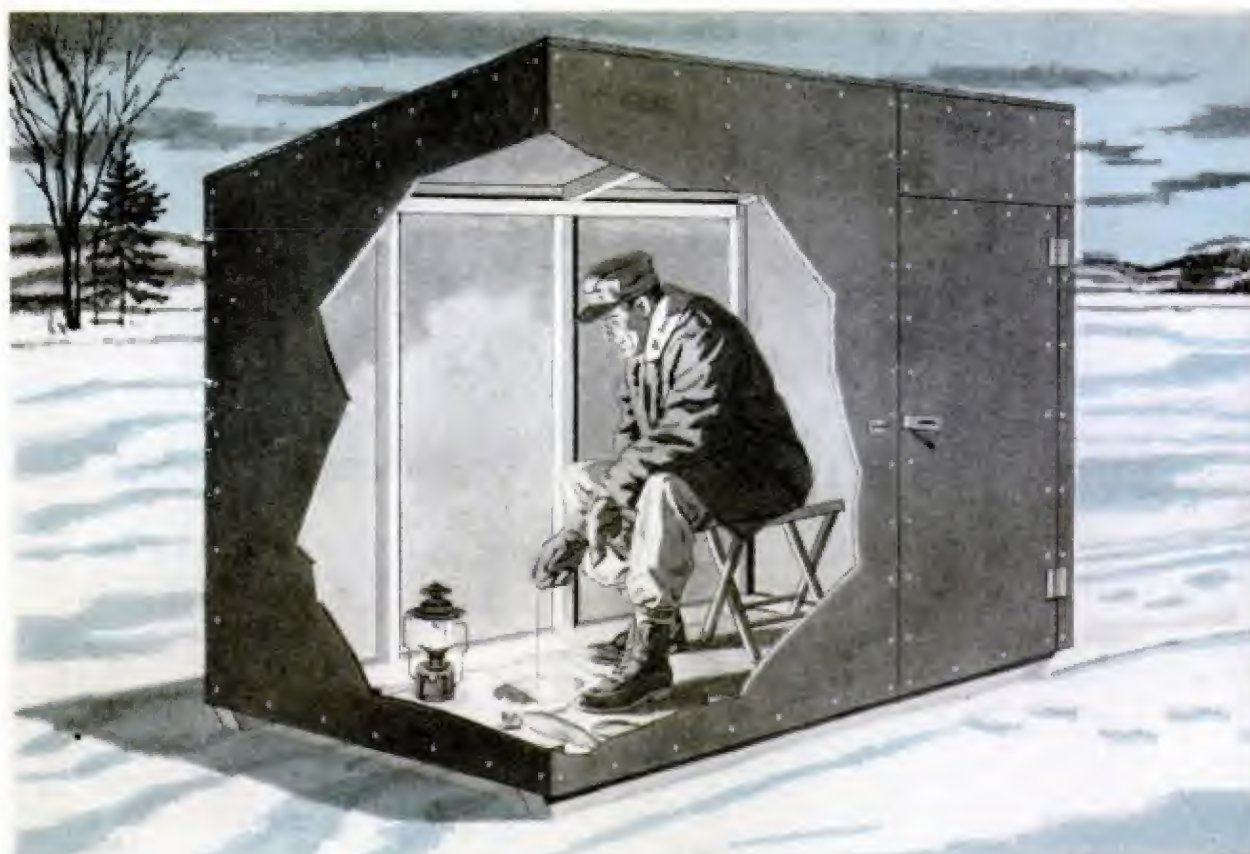


Steady Does It

If you left the house without a tripod and would like to get into the picture with the rest of the folks, a table lamp will solve your problem. Also, if you don't own a tripod, this will be a fair substitute to get sharper pictures than you would holding the camera. The difference will be especially noticeable in enlargements. You'll find that after removing the lamp finial and shade, the $\frac{1}{4}$ -20 stud will fit all standard camera tripod sockets. This idea is best for small cameras as a large one is apt to make the lamp top heavy.—*Bil Toman*

There is no need to be fumbling around for the darkroom foot switch when it's so easy to expose it without risk of fogging your paper. Simply stick two or three short pieces of luminous tape across the sides and up over the top edges. A glance will show you the switch when you're ready to make an exposure and put an end to the usual delay while you groped around searching for it with your foot.



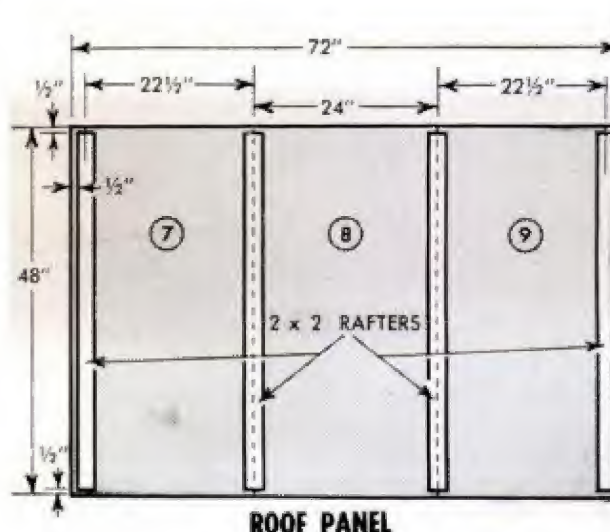
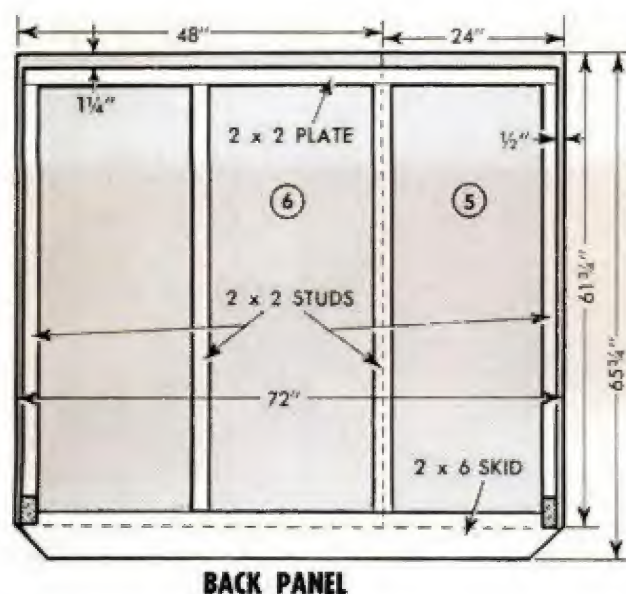


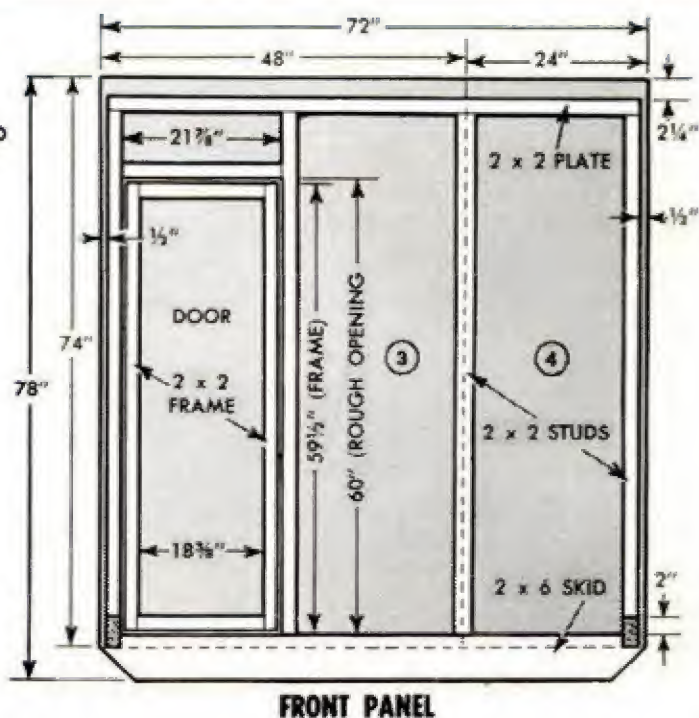
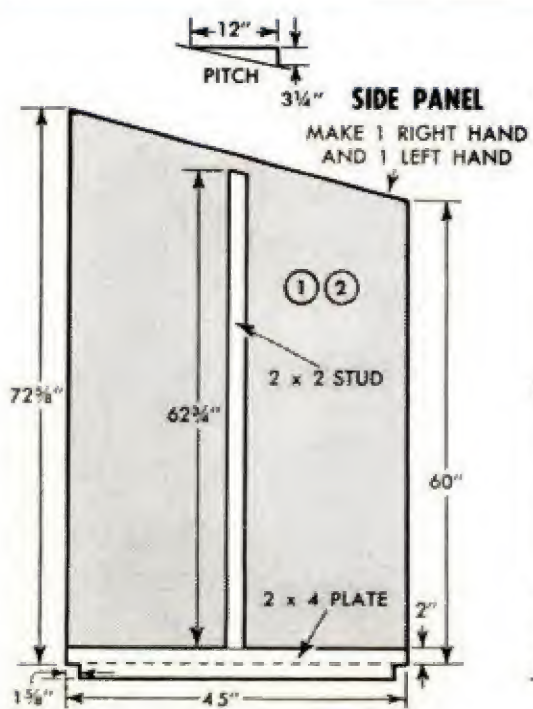
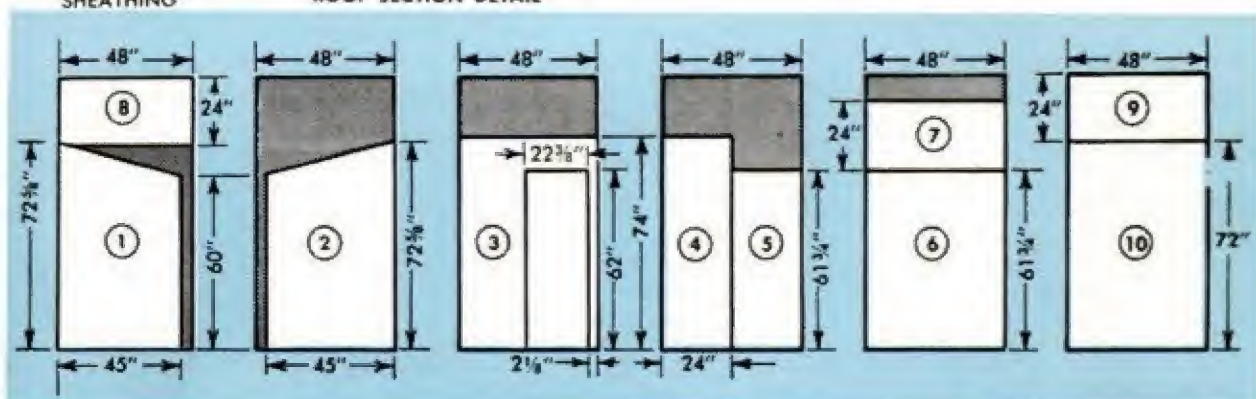
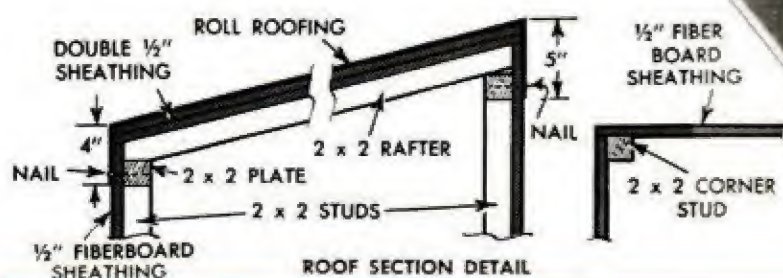
Prefab Ice-Fishing Shanty

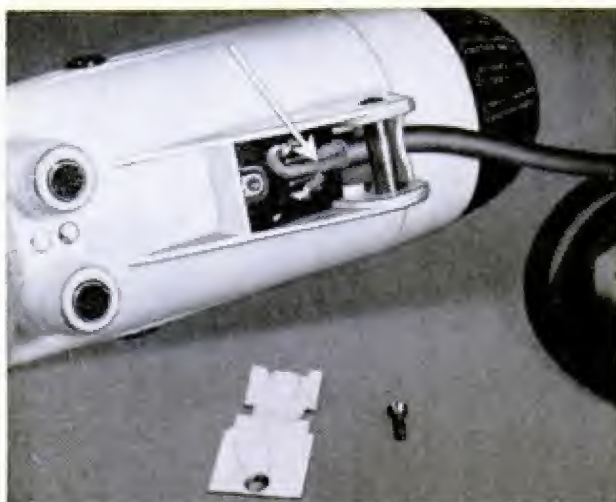
FOR LESS THAN \$25 and only four or five hours work you can own a snug portable ice-fishing shelter which may be pushed along like a sled from one site to another. Afterwards, double-headed (scaffold) nails may be pulled and the house dismantled for carting back home.

Drawings below and on the opposite page detail construction of the five panels. These can be cut and assembled at home, perhaps in a garage, and then hauled to a lake or river and nailed together with the nails

mentioned. The two end studs in the front and rear panels should be cut 2 in. shorter than the inside studs to permit the notched corners of the side panels to rest on top of the 2 x 6 skids. Six sheets of asphalt-coated, insulated sheathing are needed: The six diagrams show how to cut these numbered pieces. Roll roofing may be precut and tacked in place at the site. The asphalt-coated sheathing requires no paint; but for a different color, finish with a poly-vinyl acetate-base paint.







IF YOU ever drop your electric mixer, it's well to keep in mind the possibility that one or both the motor brushes may have been shattered in the fall. Brushes in a mixer motor will take years of ordinary wear, but the shock of a fall from the table to the floor may break one or both. It's always well to remove both brushes and inspect them before starting the motor. The center photo at the left shows what the brushes look like. To take them out you unscrew the holder, or retainer, which projects through an opening on each side of the motor housing. There's a screwdriver slot in each holder. Go light on the screwdriver and remember that the brushes are spring loaded. They'll pop out on the floor unless you grasp the holder as you unscrew it. If both brushes are okay, replace them. Be sure, and we'll repeat for emphasis—be sure they are marked so you can replace them exactly as they were originally. Also, if the brushes are badly worn or chipped, they should be replaced with new ones.

The cord on a mixer gets rough usage. If the plug end of the cord appears to be okay, take off the access plate on the underside of the motor (usually it's between the legs of the bracket) and examine the terminals, indicated by the arrow in the upper left photo. Brush away any lint that may have collected. If the cord insulation is cracked or shows other signs of wear and deterioration, it's a good idea to replace it.

Tiny motors of electrical appliances collect an astonishing

Appliance Fix-It File

amount of lint and dust and this makes it advisable to take the motor apart periodically for cleaning. Removal of the speed-control cone, or wheel, and the access plates gives you a good look at the inside of the motor, lower photo on the opposite page. Clear away dust and lint with a soft-bristle brush. Somewhere inside you'll find a capacitor, or condenser, arrow in the upper photo, right. If your mixer causes radio interference when running, then this part should be replaced.

You've already removed the brushes so now you can remove the bearing plate as in the center photo, right. In most mixers this permits you to pull out the armature as in the lower right-hand photo. Again, be careful. Don't pull things apart until you've made sure you can put them back in the same order. Brush away all lint and dust from the armature and field coils inside the motor. You'll see the brush track on the commutator, which is a part of the armature. If the commutator is smooth with no indication of grooving at the edges of the brush track, merely wipe off the loose carbon. You can polish the commutator lightly with very fine sandpaper (8/0) if you wish. Wipe clean to remove any abrasive. Clean the worm at the end of the armature shaft and relubricate, using a lubricant approved by the manufacturer.

Reassemble all parts in the reverse order. Recoil bearings sparingly, also apply oil at any other point that may be indicated by the word "oil."

—John Pennington





1. BRAKE DRUMS that may be defective should be checked by your parts dealer with a brake micrometer

When It's Time to Reline Brakes

Everyday service, a few panic stops, mountain driving, hard braking at the lights can make a good reline job something more than adding new linings

By William J. Hector

IT'S ALMOST safe to say car brakes never really fail, they're that good. But they do wear down slowly, with a proportional lessening in stopping power. Before brake wear gets to the danger point drivers usually get ample warning of that approaching time when the brakes on the car need relining.

Of course, it would be simpler and easier to just turn the job over to your serviceman and let him handle it all the way, deliver the car back to you with its brakes relined, readjusted and ready for the road again. But you learn he's very, very busy with people who want this or that done at once—can't possibly handle the job until sometime next week, if then. This opens the way for you to take the load off his back by doing a brake-reline job yourself. Tomorrow is Saturday, so why not give it a try?

If you have followed the series of articles

on various phases of brake servicing beginning in the July 1961 issue of *Popular Mechanics* you already have much of the equipment and know-how, which will come in handy on this major step in the complete overhauling of the brake system. A complete overhaul is generally thought of as shoe relining, drum turning if necessary, hydraulic-system overhaul and a major adjustment. Normally the four steps are carried out at one time.

In the accompanying photos you'll see Bendix brakes pictured. Chrysler car owners can refer to the September 1961 issue of PM for information on adjusting Chrysler brakes. You should experience no trouble with the reline job on these brakes if care is used in reassembling the parts in the same sequence as they were removed.

Start the reline job by placing a wooden block under the brake pedal to prevent it

from being depressed. Then mark the wheels and drums so that you can return them to the same locations. Loosen the lug nuts on all wheels before you jack up the car and place it on car stands or on square, stable wooden blocks. Release the emergency brake. Now remove the wheels, remembering the suggestion in a previous article to place the lug nuts in the hub caps so that none are lost. From this point on keep everything clean so that no dust, grit, or grime gets into bearings. Clean the outside of the drum and the back plate. Then remove the drums, using the puller pictured in Fig. 10 on the rear axle so that you do not risk damaging the differential. Clean the shoe assemblies and inner faces of the back plates as described in preceding articles. Then remove the shoes, using the brake tools pictured in Figs. 6, 8 and 9. Chalk identifying marks on the assemblies and keep with the individual drums, Fig. 5.

Examine each of the drums for defects described in the chart on page 192. The first three are quite easily detected by feel and a close examination. If the working surface of the drum (that surface against which the shoes seat) is exceptionally smooth or is rough in spots or all the way around the circumference, it will pay to have the drum trued up on a brake-drum lathe, Fig. 2. This gives a new braking surface with just the right tooth and corrects any minor out-of-roundness.

Slightly bell-mouthed or egg-shaped drums are more difficult to detect by examination alone. The first term, bell-mouthed, describes a condition in which the wear surface of the drum has become beveled slightly in relation to the axis of the drum, that is, it is flared outward slightly, back to front. An egg-shaped drum, of course, is

TOOLS

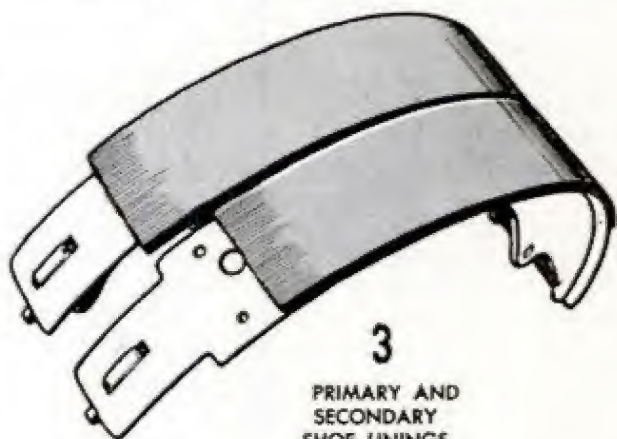
Bendix brake spring tool or
Chrysler brake spring pliers
Box wrenches
Wheel lug wrench
Brake spoon for Bendix adj. screw
Open end wrenches
Brake cylinder clamps
Large screwdriver
Water-pump pliers

MATERIALS

New brake shoes
Lubriplate
Wheel-bearing grease
New cotter pins
New wheel-bearing seals



2. TRUING BRAKE DRUMS on a brake-drum lathe is advisable if you suspect that drums are out of round



4. BRAKE-SHOE LININGS are arced to concentricity with drums on a machine designed for the purpose





5. CHALK-MARK all parts of each brake unit as they are removed and replaced to keep them in sequence

simply out of round. If either condition is readily discernible, then the chances are that the drum cannot be reclaimed.

In any case, it's always good practice to take the drums and shoes to your local auto-parts dealer for replacement of the shoes and a check of each drum with a brake-drum micrometer, Fig. 1. This instrument will detect minor and major defects in the drums and also will determine the required thickness of the replacement brake shoes, Fig. 3. If the micrometer check of the drums indicates that more than .060 in. will have to be removed by the lathe, it usually is recommended that the drum be replaced. Replacement drums for most cars are not unduly expensive and sometimes it's less trouble and expense to replace a drum than it is to recondition the original. Keep in mind that if you replace front-wheel drums, you will have to remove the hubs from the old ones and install them



6. SPECIAL BRAKE TOOLS, made for the purpose, will save a lot of time when removing or installing shoes

in the replacements. Replace the studs also.

Now comes the question of which to use—bonded or riveted linings? Both are good so it's generally best to use the type recommended for your car. Proper installation of either type should prove entirely satisfactory from the service standpoint. Either way, have the new shoes arced (ground) on a special grinding machine to fit the drums, Fig. 4. This unit grinds the surface of each shoe to perfect concentricity with the drum. Be sure you keep each pair of shoes with the drum to which they were fitted. It's a good idea to chalk-mark them as in Fig. 5, just to make sure you don't miss when you reassemble the individual brake units. Should you get them mixed you could have trouble, as diameters of the drums may vary somewhat. Another thing to be sure of will be noted from Figs. 3 and 7. Be sure that you have the shoes placed with the short, or primary, shoes in exactly

CHECK BRAKE DRUMS

ARE THEY

SCORED?

They will abrade the new linings, cutting down on the life of the lining.

SLICK?

They will not give the friction of a freshly turned drum. Turning on a brake-drum lathe cuts a new surface in the drum, smoothing any irregularities and correcting minor out-of-round conditions.

SCORCHED?

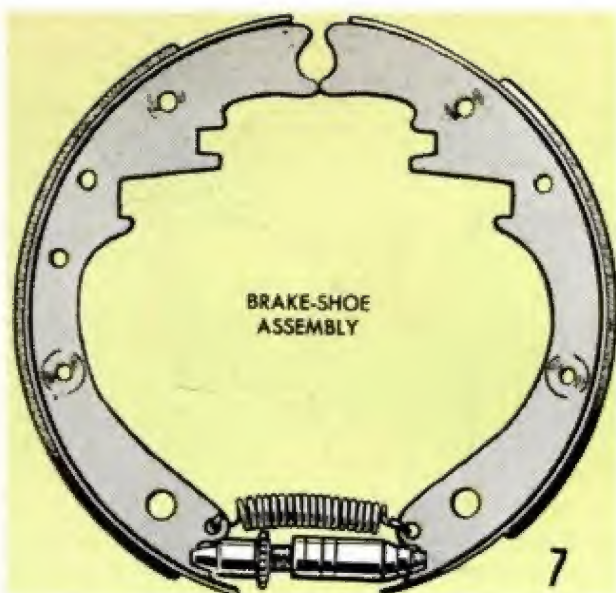
Possibly too many panic stops in a short space of time. Also, drum thickness might be too thin for adequate heat dissipation.

BELL-MOUTHED?

Gives inadequate contact area. Caused generally by ill-fitting internal brake parts, worn parts and hard braking over long periods of time.

EGG-SHAPED?

Excessive pressure may have been applied to the foot pedal. Also, too-hard application of parking brake on hot brake drums.

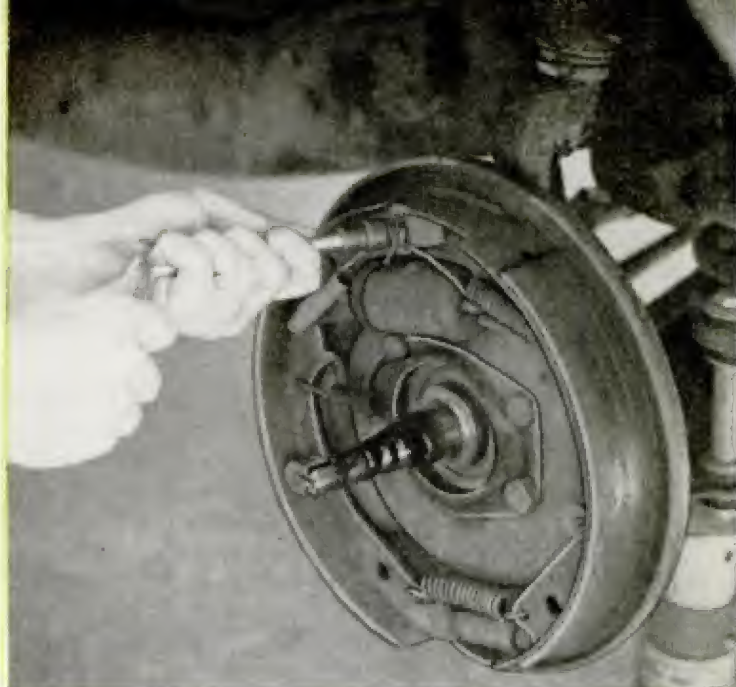


the same position as were the originals.

From here on you should take every precaution to prevent oil or grease, or any grime containing either lubricant, from getting on the working surfaces of the drums or the linings. This is especially important, as only a drop of oil or a smear of grease can cause faulty operation of the brakes even though they are properly adjusted after assembly. Even a fingerprint on the working surface of the drum can result in the immediate formation of a rust spot.

Again dust off the back plates and apply a thin film of the proper lubricant (Lubri-plate) to the anchor-pin thread and the shoe-bearing surfaces, or platforms, on the back plate. Then assemble the brake shoes in matching pairs with the adjusting screw and spring, Fig. 7. Don't attempt to place the shoes individually on the back plate, but place on the plate assembled in pairs. (front wheels first) making sure that you have the primary shoe in the position specified for your car. Also, be sure that the notches in the adjusting screw line up with the adjustment opening in the back plate. Place the hold-down springs in position and replace the anchor-pin plate. Then, using the brake-spring tool, replace the brake-shoe return springs, primary shoe first. On the rear wheels, assemble shoes on the plates and attach the emergency brake lever to the shoes, lubing the bolt position very lightly. Then place the emergency-lever shoe separator in position, making sure it is returned to the same position as originally. Replace the brake drum and repeat the sequence on the other rear wheel.

Now make a major brake adjustment on all four units (see the August 1961 issue of PM) and then give the car a road check. If you were careful with all the details, your brakes should work like new. ★ ★ ★



8. HERE'S WHERE the right tool can save time, possible hand injury and even damage to brake-shoe parts



9. TRICKY JOB on Bendix brake is removing and replacing retracting springs. This tool does it easily

10. SPECIAL PULLER of this type assures easy removal of parts without damage to rear axle or differential



Better CARKEEPING

● **INSTALLATION** of a new cover on the steering wheel of your car can be made much easier by dipping the cover in water so that it will stretch a bit. The dampness helps the cover grip the wheel, and when it dries the cover will shrink to its original size on the wheel assuring a neat, snug fit

● **TIE-DOWNS** for lumber or other materials carried for short distances on the top of your car can be kept from marring the paint if you slip a length of old garden hose over the wire or rope wherever it touches the car body. The pieces of hose can be stored in the trunk or garage for reuse

● **WHEN CHANGING** an oil-filter cartridge, put new oil in the filter case at the same time. If there happen to be any leaks, they will show up the moment the engine is started. In addition to this advantage, the oil in the case will provide instant lubrication for your engine the first time you start it

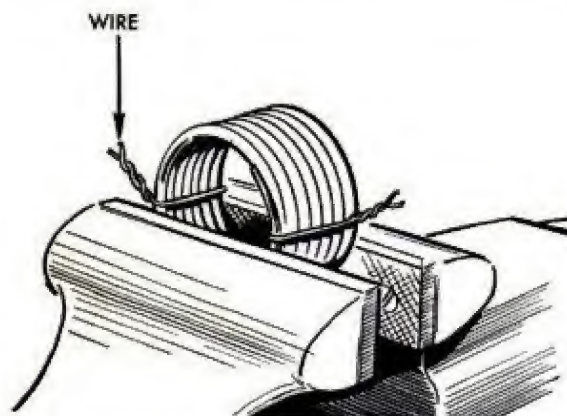
● **SPARK-PLUG** overheating, generally associated with using plugs of too hot a heat range or over-advanced ignition timing, also can be caused by insufficient fuel-pump pressure. This lack of pressure causes a lean fuel mixture at high speed and may bring about overheating of both plugs and valves

● **TO CONVERT** degrees to distance on a flywheel of any diameter, multiply the diameter in inches by 3.1416 and divide this figure, the circumference, by 360. If your car's flywheel has starter teeth, divide 360 by the number of teeth in the flywheel ring gear for the degree value of each tooth

● **HYDRAULIC VALVE** lifters can be cleaned effectively by using a synthetic rubber battery syringe. Simply draw clean solvent into the syringe, fit it to the lifter stem and force the liquid through. After all residue has been removed the ball will make a sharp click when the lifter unit is shaken

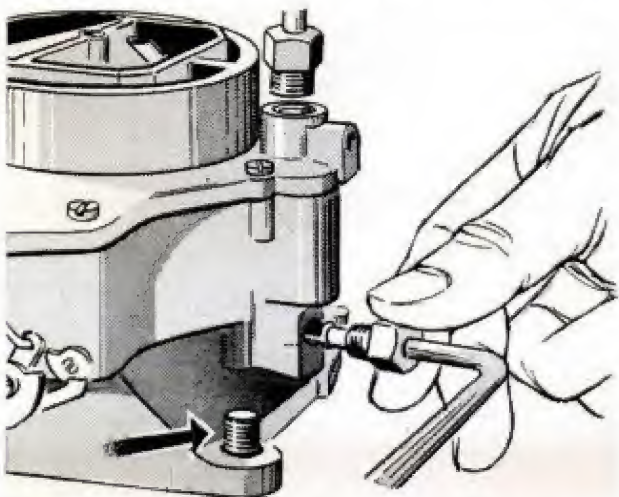


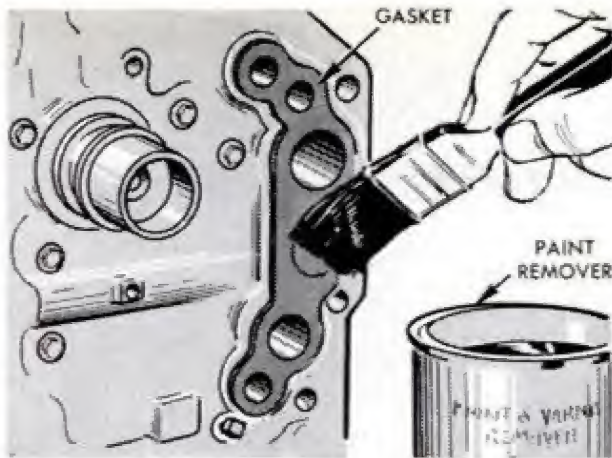
ORDINARILY you don't find a vent hole in distributor caps. Usually it's in the housing, but it's a good idea to check the cap when servicing the distributor. It's important that the vent be open to eliminate corrosive gases formed inside by high-tension current



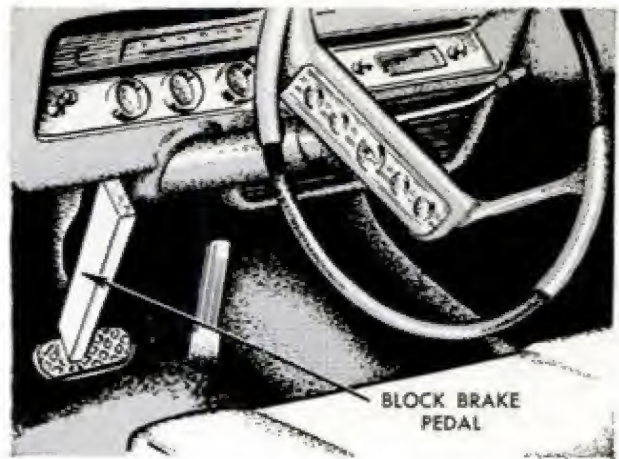
VALVE SPRINGS are easy to replace if you compress each one in a vise and keep it compressed by means of two short pieces of wire, one on each side. When the spring has been installed and the valve keyed, you can remove the two pieces of wire with pliers

WHEN REPLACING the carburetor after repair, it is sometimes difficult to attach fuel and vacuum lines. Try setting the carburetor on the mounting studs without nuts and starting all lines, then place nuts on the mounting studs and tighten all connections





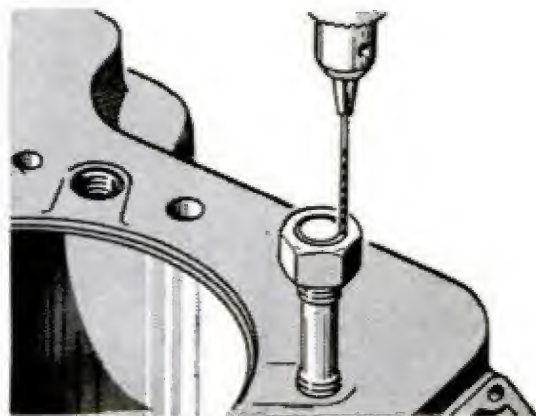
REMOVING GASKETS cleanly when overhauling an engine is always quite a problem. However, if you paint the gasket with ordinary paint and varnish remover and let it soak in for a few minutes, you'll find that the gasket will strip off cleanly every time



AFTER INSTALLING a new master cylinder you can bleed the system without help by making all connections but one, then depressing pedal to floor and holding it with a wedged stick. After connecting last line, fill cylinder and work pedal slowly to displace air

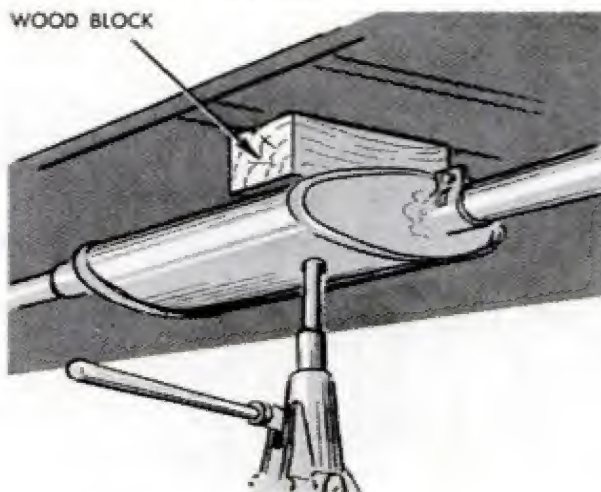


A ROUGH IDEA of the number of miles of use your spark plugs have seen since they were last serviced can be obtained by measuring the gap across the electrodes. Engineers have found that electrodes in the average plug wear about .001 in. for each 1000 miles

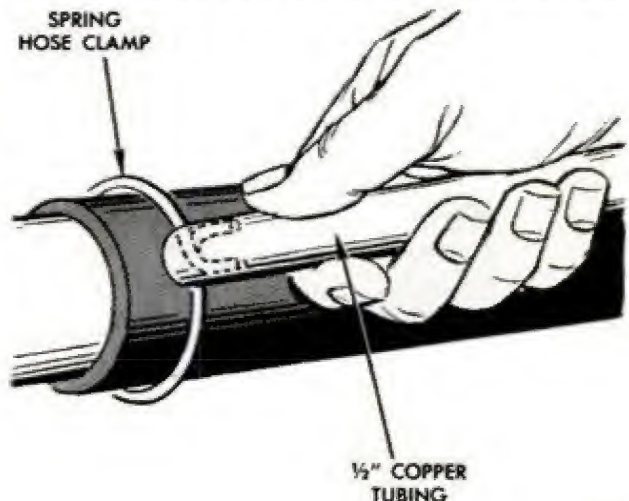


TO REMOVE a stud without damaging threads with a wrench, run a nut down until it's flush with the top of the stud, centerpunch a mark at the threads, drill a small hole and insert a pin. The pin will lock the nut so you can turn out the stud by the nut

TAIL PIPE can be replaced without damaging the muffler if you place a wood block between the car frame and muffler, then set a jack directly under the block below the muffler. Put just enough pressure on the jack to hold the muffler in place while you work



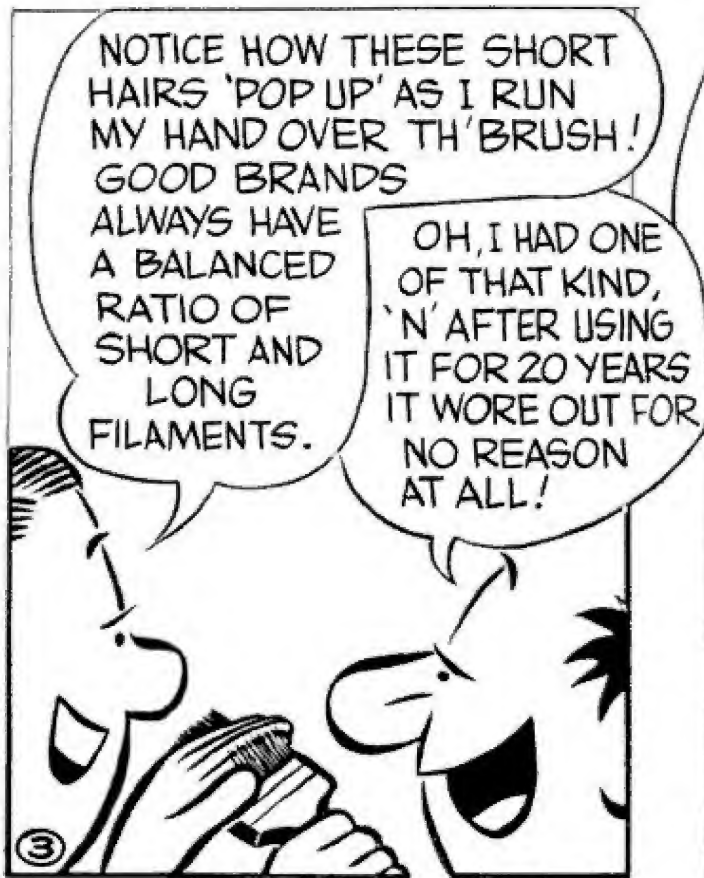
SPRING-TYPE HOSE CLAMPS on lower radiator connections are difficult to hold open when connecting hose. However, if you squeeze the clamps open and force a short length of 1/2-in. copper tubing over the ends as shown here it will hold the clamp open



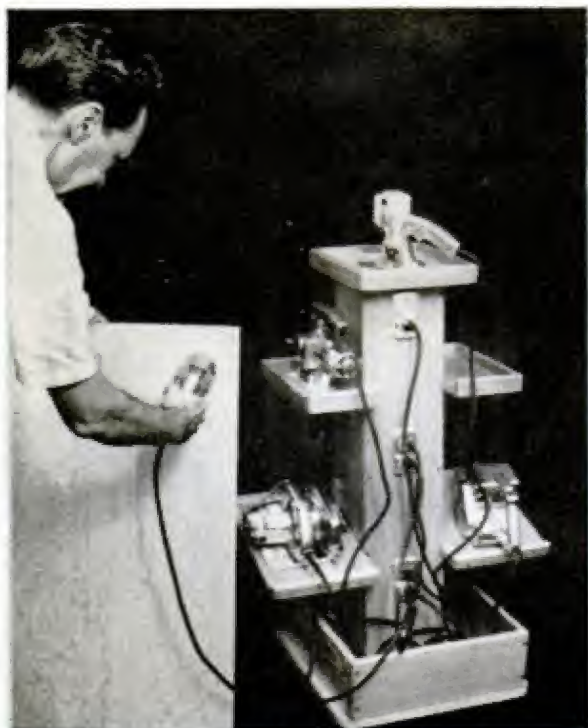
MR. DO-IT AND BLINZLE



When a helpful clerk tries to tell Bungle how to recognize a good paintbrush, he discovers that what's really needed is a high-quality brush-off



Coming Up Next . . .



MOBILE POWER TOWER. And that's just what it is, the handiest caddy ever for portable power tools. There's a place for power cords, shelves for the individual tools and a plug-in panel. You can make one like it in the March PM.

JET-POWERED BOAT. The PM boat of the year, powered by the newest thing in boat propulsion—the turbojet. Two-part construction story completely details the hull and engine and pump installation. Be sure to look for it in the March issue.

DUAL-PURPOSE TABLE. Not only serves as a chairside table but a place to park a roll-away bed. Clever out-of-sight place to store a stand-by bed for an extra guest, it's ideal, too, for one-room apartments. You build the table, buy the bed. See how it's done in the March issue.

MAKE YOUR OWN BANJO. Excellent musical instrument at a fraction of the store price. Precut kit provides materials, solves problem of hard-to-get parts, lets you take over and complete it. It's a craft special for March.

COIL WINDER. Winding a coil on this unit is like winding a bobbin on a sewing machine and just as fast. Motor driven with foot control, automatic counter, it's the shop project for next month.



Safe Anchor for Pipe

Fairly long lengths of pipe can be hauled safely in a pickup truck if you keep them from rolling about with this anchor consisting of a C-clamp and a webbing strap with a buckle. Just tighten the clamp on the endgate and strap the pipe tightly to the clamp.—G. E. Hendrickson

Out of the Doghouse

Rover — if that's his name — is going to appreciate this ventilator for his one-room apartment. The ventilator itself is ready-made as it's simply a downspout elbow turned upside down and fitted tightly in a hole cut in the back of the house.



SHOP SHORT CUTS

Quick Brush-Off

Drillstands have a way of collecting a coating of oil and dust which soon obscures the marks indicating drill-bit sizes. Cleaning is something you put off because of the time it takes to remove the drills, clean the stand and replace them. Next time the stand needs cleaning, dip a bottle brush in cleaning fluid (remember the fire hazard) and run the brush through the spaces between the rows of drills. A few strokes in each space do the job.—Walter E. Burton



Rough and Ready

To save time changing sandpaper sheets on his pad sander one craftsman makes an extra sanding pad by cementing a sheet of the desired grade of abrasive paper to a piece of inner tube cut to the exact size of the pad-sander platen. He uses the coarse grade of paper on the platen and when the work is ready for finish sanding he places the extra pad on the work and the sander on the pad and proceeds with the finish sanding without any time lost changing sheets. It is not necessary to attach the rubber-backed sheet to the sander pad.

—H. Hanscom



Hold Everything

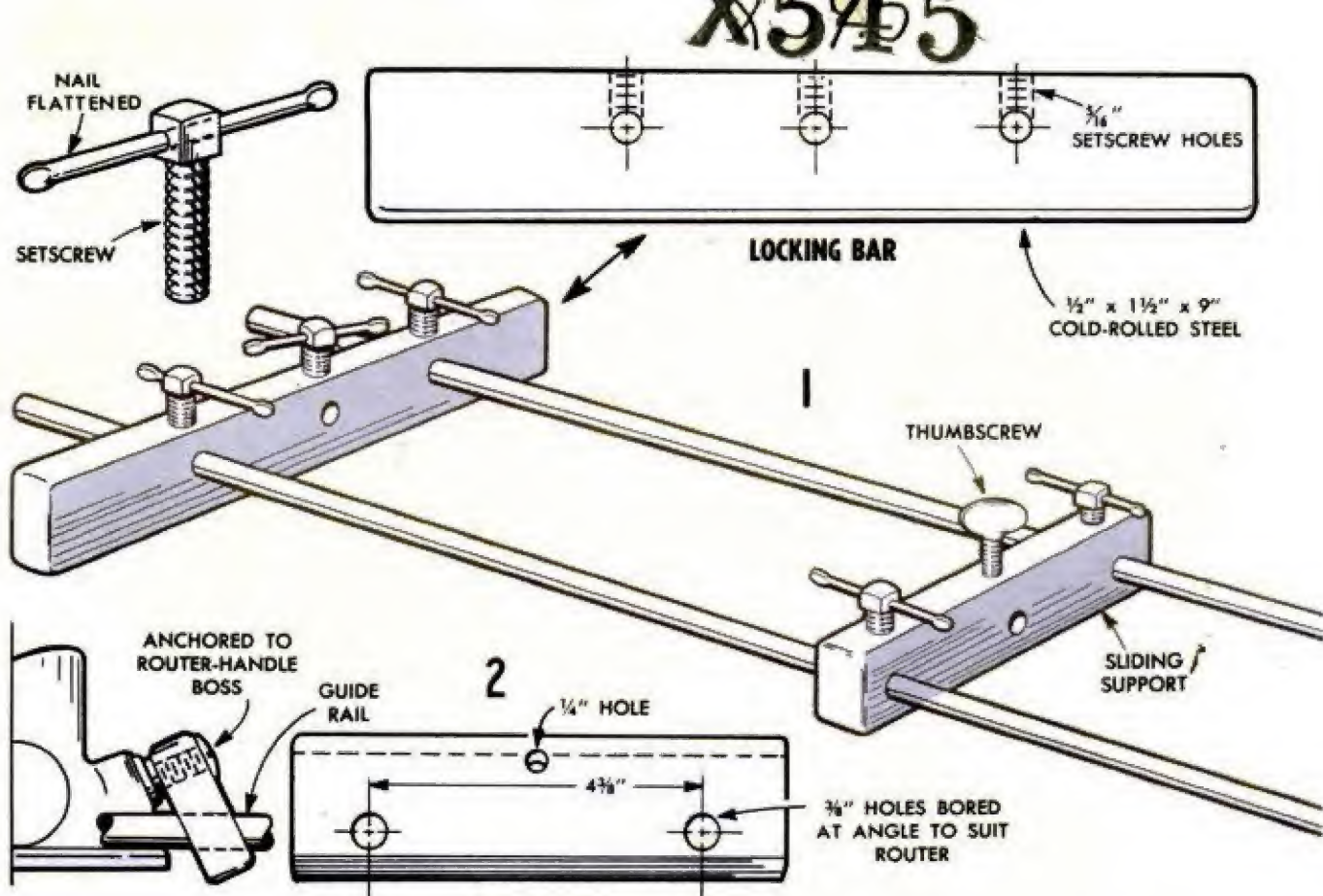
Remember this useful shortcut the next time you find it necessary to hand-hone the knives of your 4 or 6-in. jointer. Each knife can be held easily at the proper angle for honing the bevel as well as for oil-stoning the flat side to remove the wire edge, simply by clamping it between the blade and the cap iron, or chipbreaker, of your hand plane. The double plane iron provides a reasonably comfortable grip, sizeable enough to give the necessary control better than any other improvised arrangement except, of course, a jig which is especially made for the purpose of grinding and honing jointer knives.



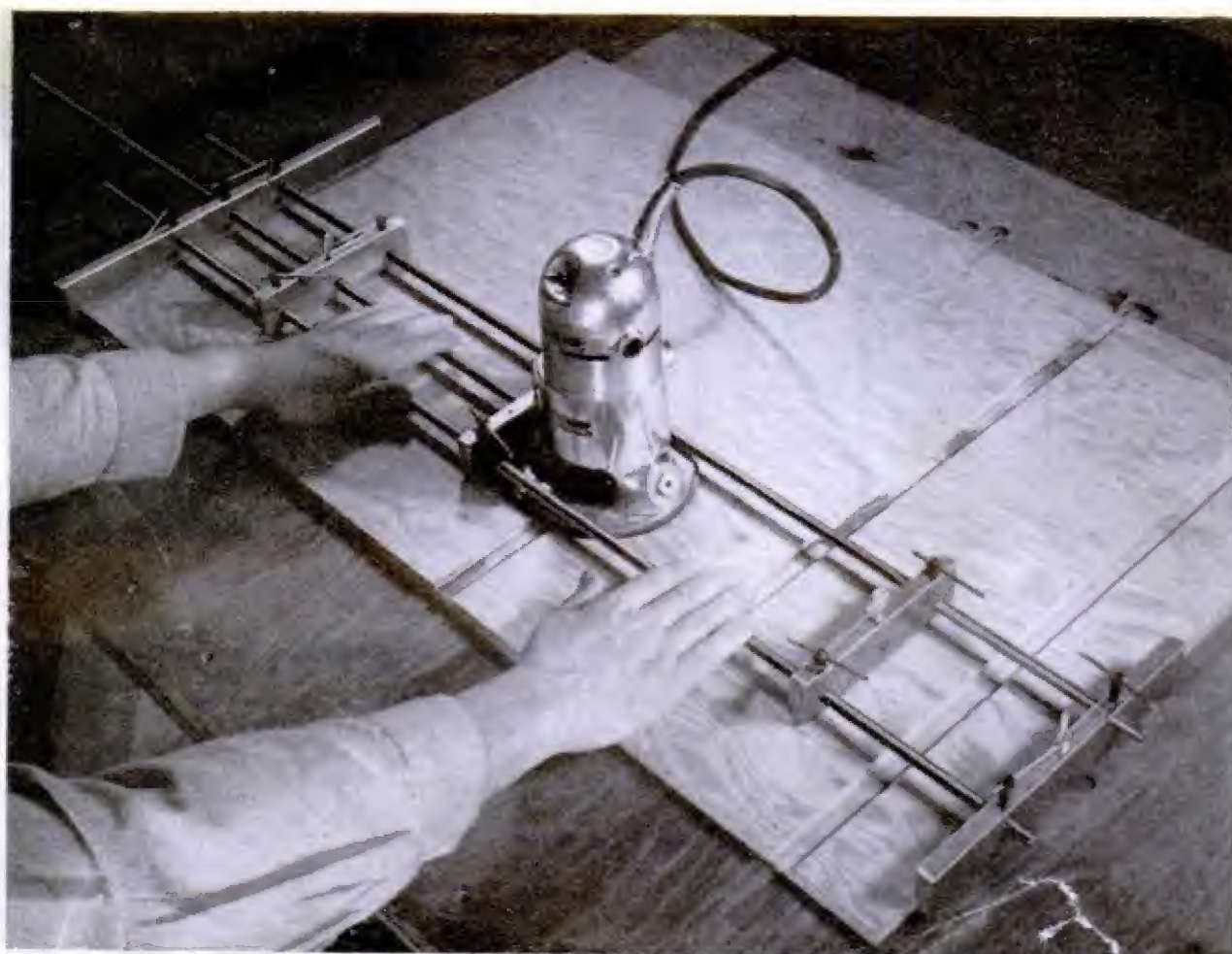
Square Edges

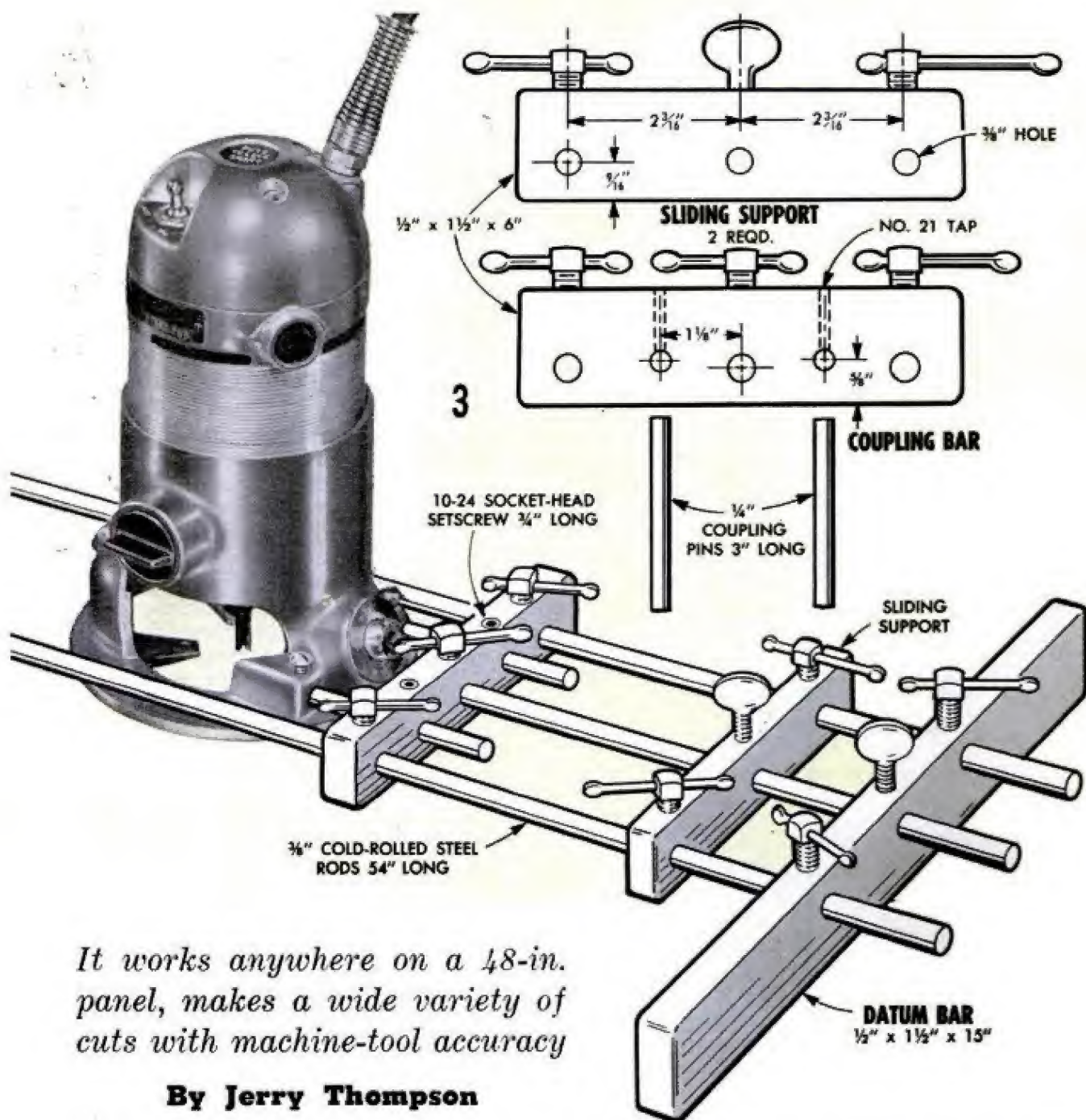
Squaring the edge of the stock perpendicular to the face with a hand plane is a neat trick if you can bring it off successfully. But with this guide attached to your hand plane it's no problem at all. Cut a piece of 3/8-in. plywood to the length of the frame of the plane and then cut a wide rabbet on one edge, the depth about 3/16 in. and the width equal to the height of the plane frame at its highest point. Trim the rabbeted edge to the approximate contour of the plane frame and then clamp to the side of the frame as pictured.





Shop-Built Router Guide





It works anywhere on a 48-in. panel, makes a wide variety of cuts with machine-tool accuracy

By Jerry Thompson

ONE LOOK at the guide detailed in Figs. 1, 2 and 3 and you get a good idea of how it extends the range of a portable electric router. Or drop your eye to the job pictured in the photo on the opposite page. You could very well have some difficulty handling this job on an industrial-size circular saw. But the router, mounted in this guide, buzzes those dados across the panel in seconds per cut.

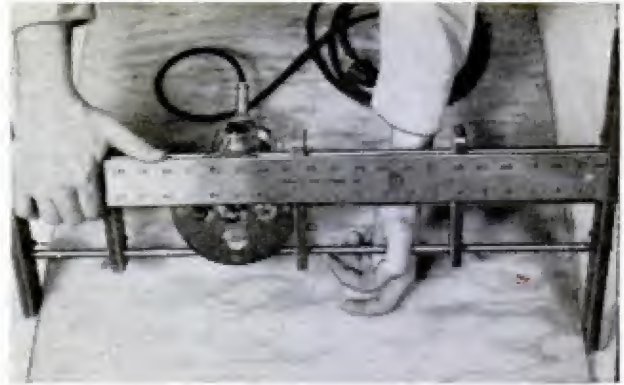
Basically, the guide consists of three $\frac{3}{8}$ -in. steel rods (drill rod is best) and five sliding members cut from $\frac{1}{2} \times 1\frac{1}{2}$ -in. cold-rolled steel. The third rod is the same length as the other two but is not shown full length in Fig. 1. Routers of the type and size pictured are supported by a sliding coupling bar and pins detailed in Fig. 3. The pins enter holes in the router base,

Figs. 1 and 4, which normally take the rods supporting the regular guide for straight and curved work which is supplied as a router accessory by the manufacturer.

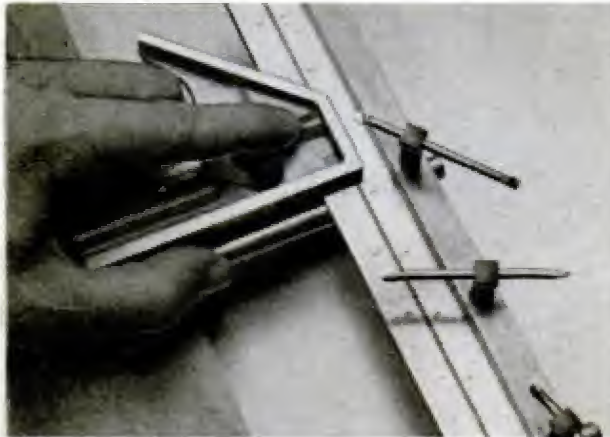
Note that all five bars have three holes drilled on $2\frac{3}{16}$ -in. centers. In the hole layout it's important that this spacing be maintained as otherwise the bars will bind on the rods when moved close together, as is necessary in some types of work. All the bars are drilled and tapped for $\frac{5}{16}$ -in. setscrews. Instead of the handled setscrews detailed, you can, of course, use $\frac{5}{16}$ -in. thumbscrews, three of which are shown in Fig. 1. The only exceptions are the two socket setscrews which hold the coupling pins in the coupling bar. Spacings of the holes for the pins may have to be changed to suit different makes of routers.



4. BASES OF SOME portable routers permit mounting by means of a coupling bar and short coupling pins



5. TO SET for spaced cuts measure from face of datum bar to side of router bit. Then lock coupling bar



6. DATUM BAR should be set square with guide rods then locked to guide bars. Normally it is not reset



7. HERE router is supported clear of recessed surface by second coupling bar attached to handle boss

8. NOTCHED GUIDE STRIPS are used to hold work for diagonal spaced cuts. Slide supports ride guides



In use, make sure when you set the datum bar, or stop, that it is square with the rods, Fig. 6. Once set, it normally is not changed. Then to run a cut a given distance from the inner face of the datum bar you simply measure the required distance from the face of the bar, which rides the edge of the workpiece, to the side of the router bit nearest the face of the bar as in Fig. 5. Then bring the locking bar up to the opposite edge of the stock and away you go.

When making parallel cuts $2\frac{1}{2}$ in. and less from the edge of the work, the width of the work must be increased by placing 3-in. fill-in strips along each edge, Fig. 7, to provide additional crosswise travel of the router, for the stop and datum bars to ride. Here also you will note that the router itself is supported above and clear of the surface by a second coupling bar, Fig. 2, which is attached to the opposite side of the router base. As detailed, the second coupling bar not only is drilled to travel on the guide rods but is drilled at an angle near the edge for a screw which is turned into the tapped boss which holds the router handle. Guide strips also are used for the job pictured in Fig. 8. In this instance the guide strips are notched to take the diagonal corners of the work. In Fig. 9 spaced dados are being worked in two directions. ★ ★ ★

9. SPACED DADOES, run in two directions, complete a pattern on face of stock. Note that stopblock is used





Electric Guitar in a Kit

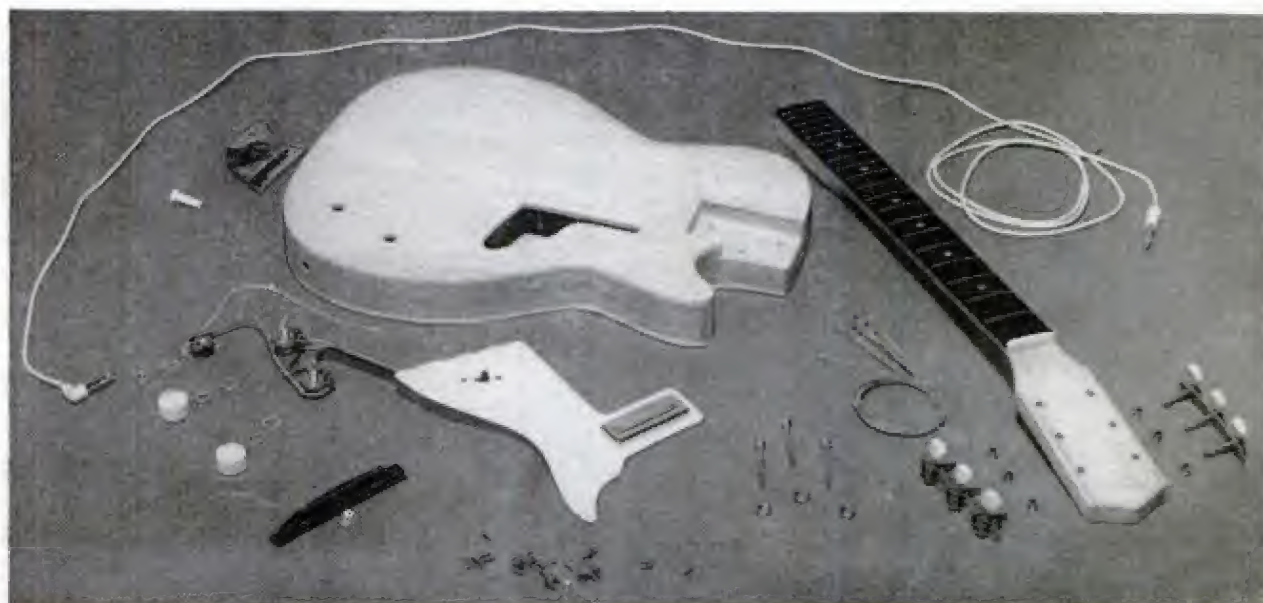
DID YOU EVER wonder why certain stories appear first in some magazines and are then seen later in others? Here's a good example:

One of *Popular Mechanics'* editors had an idea for a new kit for PM readers. He discussed it with a manufacturer of electric guitars. The manufacturer was enthusiastic and, in less than three months, had pre-production models ready.

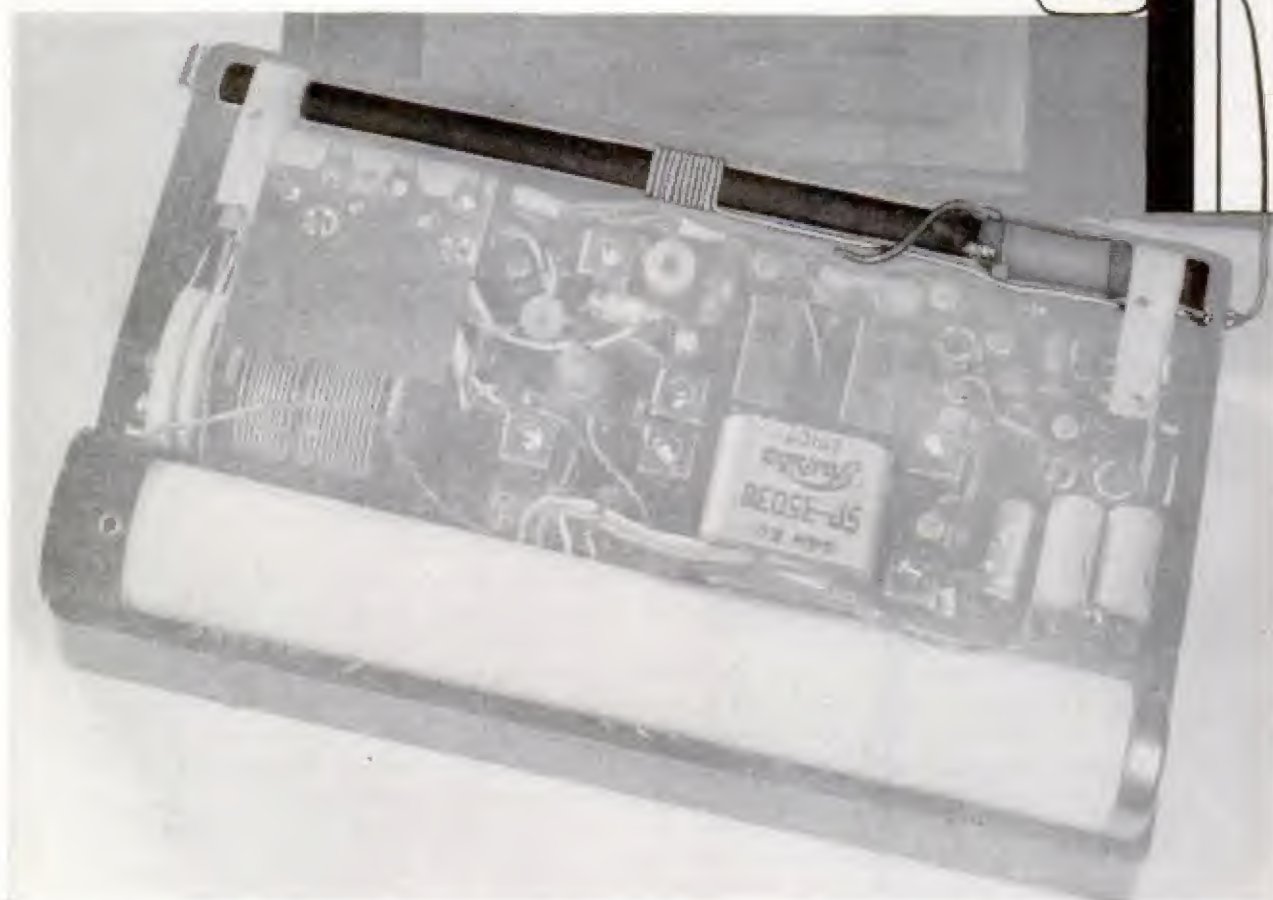
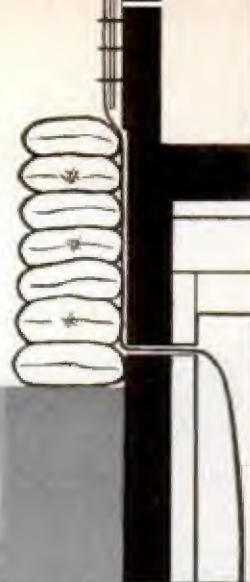
The manufacturer now has a new product, PM has another exclusive story and readers can obtain a fine electric guitar by assembling it from a kit. The guitar is equal in every way to a commercially manufactured \$75 instrument.

The kit is easy to assemble as the body comes cut, glued, sanded and presealed.

The white plastic border on top and bottom is already installed, and all that is left for you to do is finish and assemble. Use the three large screws to attach the prefinished neck and fingerboard. Mask the fingerboard and either lacquer, enamel or varnish the presealed wood to your own taste. Attach the prewired controls and pickup along with the plectrum shield. Assemble the patent head, the tailpiece and the bridge. Add the strings, tune up and you are ready to plug into any amplifier, tape recorder or phono, and play. If you want to hear real quality, plug it into the magnetic phono input of your hi-fi. The electric guitar is available at \$41.80 from McMurray Music, 10201 Page Blvd., St. Louis 32, Mo.



Outdoor Antenna for Fallout Shelter



A SHELTER which shields you from fallout may also shield a good part of those important Conelrad civil defense announcements—your key link with the outside world.

The Office of Civilian Defense and Mobilization has suggested an outdoor antenna system using a loop antenna to transfer maximum signal to the indoor radio. While this will work very well with older radio sets using flat loop antennas, if your radio is a transistor type with a ferrite rod antenna, there's a better way of beefing up reception.

Form a coil of enamel-insulated wire, about 18 gauge. The coil should contain five to ten turns of wire and use a few drops of polystyrene "Q" dope or plastic cement to hold the coil in shape. Connect one lead from the coil to a small phono jack which you mount at the side of the case.

Bring your outside antenna wire into the shelter and plug it into the jack. Turn the radio on and tune to a weak station, as close as you can to either 640 or 1240 kc., which are the Conelrad civil defense frequencies. Slide the antenna coil along the ferrite rod until you hear an increase in volume. At this point, fix the coil to the rod with a drop of cement.

This improves transistor radio reception, whether the radio is used for a fallout shelter or a playroom. The single connector can easily be removed so you do not sacrifice portability. For sets with flat or oval ferrite antennas, make the coil slightly larger, and squeeze to fit. ★ ★ ★

When your TV picture begins to look dim, remove the front from the set and clean the tube face and glass shield with a wax-free spray type glass cleaner.

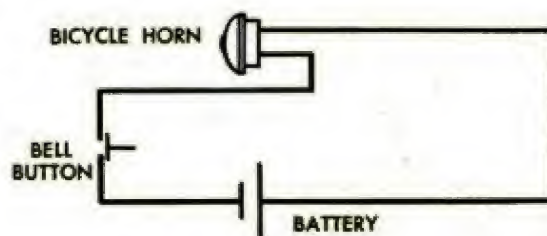
Everyone Needs a

Are your bills still due from three months ago? Is the boss glaring at you whenever he walks past your desk? Wife threatening to leave? Relax. Build a panic button!

This fun-for-all gadget uses a bicycle horn, or you can take a battery-operated fire alarm apart to get the horn-bracket-battery combination, as we did for this one. The entire assembly fits neatly into a miniature cabinet box, with the horn exposed at the front. The doorbell switch mounts on top. When things get too deep, simply push the button. The result is a loud, albeit sympathetic "BLAA-AA-AAT"!

Measure the required front hole for the horn, and after punching this hole, set the bracket for the 1½-volt flashlight battery in place. This is mounted through the bottom with two screws. The button is wired through a small hole in the top, and using the case as ground, only one wire needs to be passed through.

When the unit is completely wired (see diagram right) place it on the corner of a desk and watch while your visitors enjoy the fun.



Wall-Mounted Loudspeakers



Many technicians will recall the problem of installing wall-mounted speaker enclosures. You had to work on a ladder, often with hot soldering iron clenched between your teeth while you struggled with screwdriver and balky bolts.

The new clips shown here mount on the wall first, using the pattern sheet as a guide. After the clips are secured in place, the cabinet itself is carried up the ladder and slipped over the clips. Simply pull it down to secure. After the speaker has been mounted to the inside of the front grille, it is wired and then the lead is brought above and behind the enclosure. Slip the top of the grille into its notch, press the bottom in place and fasten the one wood screw which holds it all together.

The units are available in a wide assortment of styles and sizes. Argos Products, Genoa, Ill.



Electronically New



CHANGE YOUR TV ANTENNA rotator from manual to fully automatic operation. Device is installed by transferring three wires and cutting and taping the fourth. When you set desired direction, antenna follows. \$32.95, Channel Master, Ellenville, N. Y.



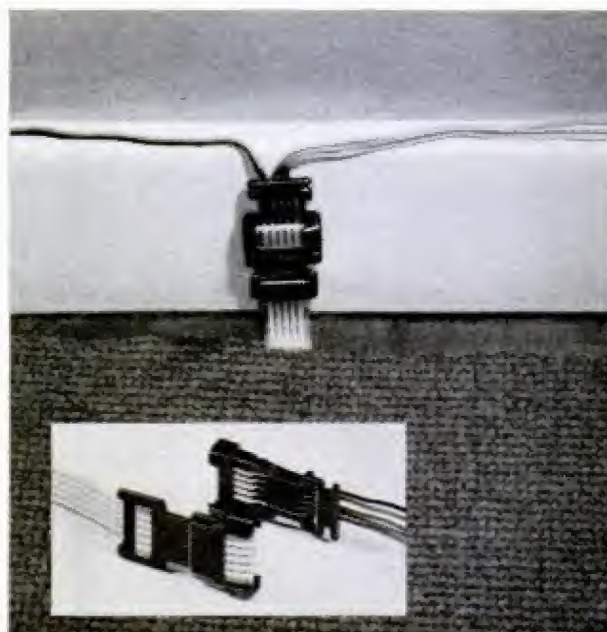
NEW MAGNETIC RING is fitted to earpiece of hearing-aid eyeglasses. Permits user to remove glasses easily in only two seconds by decoupling from the earpiece. Ring disconnects from earpiece which remains in ear. Zenith Radio, 6001 W. Dickens, Chicago



CONNECTOR FROM GERMANY utilizes conical aperture with metal ball and coiled spring. Press the wire into rear hole to make contact; spring and ball hold wire in place. Insert toothpick or pencil to release. Kaye Text Products, Lichtenstein, Germany



PEOPLE DEPRIVED OF THEIR VOCAL CHORDS due to operations need not be embarrassed. What appears to be a high-grade pipe contains a voice generating circuit, which "pipes" the sound through the stem and into mouth. Ticchioni, 14 Durini Street, Milan, Italy



DID YOU EVER try running wires under a rug? The unsightly bulge that usually results can be eliminated by use of flat, multiple ribbons and adaptors to connect to regular wires. Great for your stereo speakers. Thomas & Betts, Elizabeth, N. J.

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Smart idea! Set aside a shelf in your workshop for the Weldwood® glues and finishes you'll need in the coming months. You'll save time and trouble—and do a better job, too—because you'll always have the *right* materials on hand when you need them. Suggestions: Weldwood Plastic Resin and Presto-Set® Glues, new Deep Finish Firzite, Satinlac® self-sealing natural finish, Weldwood Putty Sticks, and Flexible Wood-Trim® for edging plywood. At lumber yards, paint and hardware stores.

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you'll have to
listen 17% harder
to hear a
Galaxie
whisper



Its silence whispers quality . . . for there is no surer proof of the care with which a car is built than the quiet with which it runs. A decibel meter in the

front seat revealed a 1962 Galaxie is 17% quieter than last year; the built-in protection of twice-a-year—or 6,000 mile—maintenance insures it will *stay* quiet.

How did America's quiet car get even quieter? It took a "tuned" frame, a nylon dot, a fiber sandwich—and new advances in Ford's new science of *automatic* quality.

It is perfectly true that last year's Galaxie was so astonishingly quiet it made the \$10,000 cars of only a few years ago seem crude by comparison. But it also is perfectly true that *this* year's Galaxie is substantially quieter . . . 17% quieter in the front seat, 21% quieter in the rear seat.

No one big invention made the difference. These cars move like a silk banner in a summer breeze because hundreds of little things were improved, because Ford's quality control is now the highest in the industry . . . and because Ford has made silence *automatic* by ingenious design techniques.

A tiny blob of nylon is one example of this new approach. You see it illustrated on the finger at right: a "sleeve nut" that connects a rod and lever in the door latch. In 1961 this connection was made by a metal spring clip; no matter how carefully made or fitted there was always the possibility of wear . . . and a faint little vibration. Now the rod snaps into a hole in the soft nylon nut, the nylon snaps into the lever . . . and

there is no possibility of metal-to-metal contact.

We also have taken one of the largest things in a Galaxie, the frame, and "tuned" it by designing in a minute degree of flex. Thus it becomes a giant spring, over 16 feet long, that blots up road noises that get past tires, springs and shock absorbers.



New nylon "nut" helps soundproof doors.

The "fiber sandwich" is a ½-inch thick batt of textile fibers that runs from the top of the toe board on down under the front seat. When you realize this is sandwiched between a double-ply layer of waffle felt deadener *and* a thick jute blanket *and* covered by the floor mat you stop wondering why any Galaxie engine is so hard to hear.

These are merely three examples from thousands, all devoted to the single aim of making a Galaxie quiet. It would take a library to tell the whole story, to even begin to sum up Ford's standards of craftsmanship . . . but the *result* is beautifully, silently obvious the moment you take the wheel.



Galaxie by Ford

CLINIC FOR HOMEMAKERS



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

Oil Stains on Concrete

Q—We use our garage as a playroom for the children when the weather is bad, but they get into the grease and oil on the concrete floor. Is there an easy way of removing these stains?—S. K., Mo.

A—You'll have to work at it, but here is one way of cleaning oil from concrete. If you need the floor only clean enough so the kids can play without ruining their clothes—and not spotless—your job will be simplified. Also, by removing the stains as soon as possible, the work will be easier.

With a wide scraper, remove the thickened crust of grease and dirt as best you can. This should be followed by a good scrubbing with a stiff brush dipped in gasoline (be careful to follow safety precautions). Then, the surface should be scrubbed again with detergent and warm water. Usually this treatment is all that's needed to clean a floor. But where appearance is important and the stain has penetrated deeply into the concrete, it will require more attention.

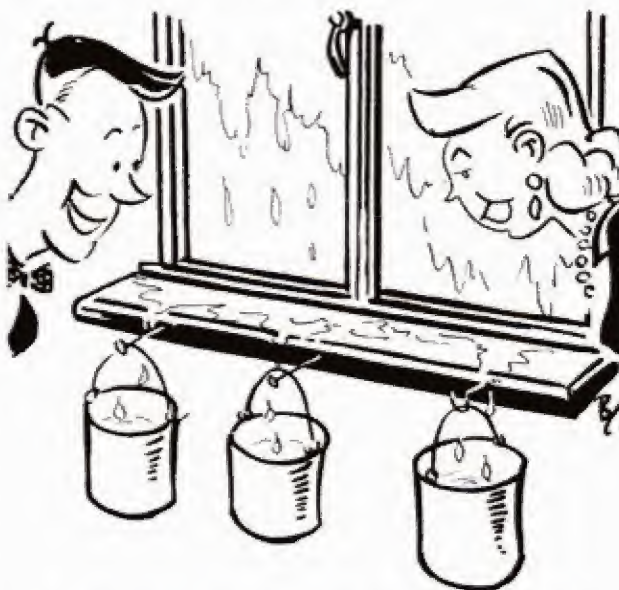
On deep stains, use a 10 percent solution of muriatic acid to scrub the remaining spots (avoiding contact with skin). And for those extremely stubborn blotches, use



the bandage method: Pads of absorbent cloth are saturated with chemicals, laid over the spots, and covered with glass. Finally, rinse with clear water.

Too Much Humidity

Q—We own a new brick home with aluminum storms and aluminum windows. The windows are excellent, but in winter we have trouble with moisture collecting on the metal window frames. Water keeps running onto the sills. How can we correct this problem?—H. B., Penn.



A—Unlike the loosely built homes of a few years ago, modern, tightly constructed homes with vapor-sealed walls and weather-stripped doors and windows are practically airtight. From such homes it's difficult for water vapor to escape. The dew-point temperature at which vapor condenses varies with the temperature and amount of water in the air. Condensation principle is illustrated by a sweating glass of ice water.

During winter, when outside temperatures are low, windows provide cold surfaces on which water vapor may condense. Condensation usually is confined to glass areas; but, when metal sashes are used, the inside surfaces have more of a tendency to sweat and frost than do wooden ones. Sweating should be a warning to reduce inside moisture.

The quickest way of reducing water vapor is to open a few windows. Exhaust fans installed in kitchen, utility, and bathrooms, however, are the most satisfactory method of ventilating, especially during the winter. The second way is to eliminate some of the sources of water vapor. Bathing, washing, and cooking produce most of the vapor within a well-constructed house. Finally, an electric dehumidifier is a highly efficient way of reducing water vapor. ★ ★ ★

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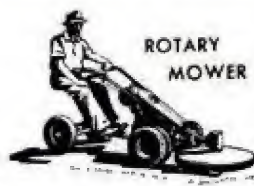
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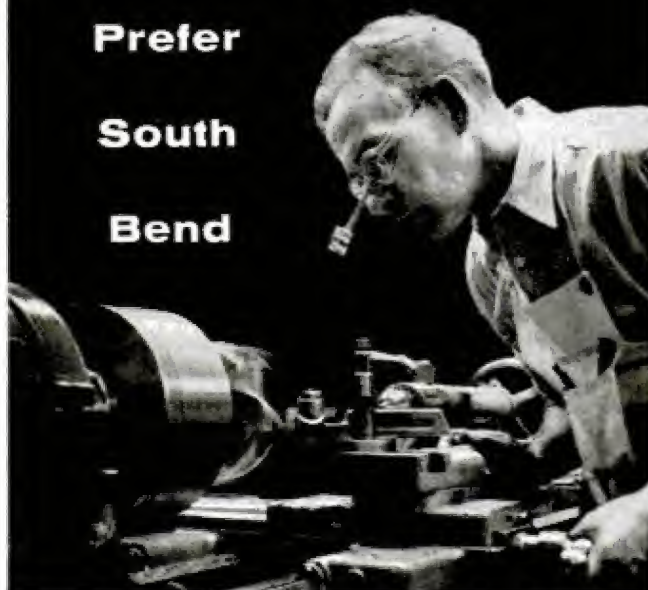


Photo from Learcal Division, Lear, Inc., Los Angeles

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months to pay.

Danish-Style Metal Furniture

(Continued from page 159)

hardboard doors and the interior of the cabinet are sprayed white, after which regular aluminum door track is installed. Screws driven from below through holes in the steel angle anchor the desk top in place.

After cutting the plywood panels for the arm chair and ottoman, Figs. 3 and 4, fasten the chair back to the seat with 2-in. angle brackets. Then add the sheet-metal side supports to opposite edges of the chair back to align with the holes in the arm rails. Upholstering the chair and ottoman is comparatively easy, both being fitted with foam-rubber cushions. In the case of the chair, seat and back cushions are worked up separately, then attached to the panels. When cutting the 2-in. foam rubber, add an extra inch all around to allow for compressing. The original cushions were made of a plastic fabric called Naugahyde and require 2 yards, 54 in. wide. Measure and cut the fabric to the sizes given, Fig. 6, and sew the welt cord into the seams in the manner detailed in Fig. 5.

Cotton Added First

Begin actual upholstering by adding cotton batting to the rear side of the chair back, stapling or tacking it here and there to hold it in place. The chair and the ottoman require about 3 yards of cotton batting. Next place the foam rubber in position and cover with a layer of cotton. Follow by the cushion cover and staple the back flap across the lower edge of the plywood panel. Do not fasten the lower outside flap at this time. The seat is upholstered in much the same way. Staple the rear flap across the rear edge of the seat panel, place the foam rubber in position and cover with cotton. Pull the cover on over the cotton, check for low spots and add more cotton where necessary. Finally, staple or tack the cover and as a last step draw the lower flap of the back cover under the seat and tack, Fig. 2.

To add the cushions to the chair, punch holes through the fabric where it covers the sheet-metal side supports and attach to the arm rails with $\frac{3}{16}$ -in. machine screws turned into 10-32 Tee nuts. After this, turn the chair upside down and attach the seat cushion to the seat rails with round-headed wood screws. Finally, the prefinished walnut chair arms are attached with screws.

The ottoman, detailed in Fig. 4, can be made to serve also as a small coffee table by having an extra top handy to replace the cushion. In either case, the cushion, as well as the extra top, merely rest in the recess of the steel-angle frame. The extra top can be covered with laminate. ★ ★ ★

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Triple-Top Fun Table

(Continued from page 180)

the nuts up tightly. Now drill $\frac{3}{4}$ -in. holes on the center line penciled on the bottom of each end cabinet. These holes take the studs as in Fig. 34 and must be located so that when the caster is in place, the outer edge of the plate will be $\frac{1}{4}$ in. in from the edge of the cabinet. Locate the casters with brakes on opposite corners to prevent the table from moving while play is in progress.

Four table levelers are necessary to assure a perfectly level pool-table bed. These

MATERIALS LIST

(All dimensions actual sizes in inches)

- 2 pcs.— $\frac{3}{4}$ x $13\frac{1}{4}$ x $35\frac{1}{2}$ —Base of end unit
- 4 pcs.— $\frac{3}{4}$ x 14 x $20\frac{3}{4}$ —Sides of end unit (2 R. and 2 L.)
- 2 pcs.— $\frac{3}{4}$ x $11\frac{3}{4}$ x $20\frac{3}{4}$ —Center divider
- 4 pcs.— $\frac{3}{4}$ x $11\frac{3}{4}$ x $17\frac{1}{8}$ —Shelves—end unit (2 R. and 2 L.)
- 2 pcs.— $\frac{3}{4}$ x $2\frac{3}{4}$ x $35\frac{1}{2}$ —Face spreader for end unit
- 4 pcs.— $\frac{3}{4}$ x $\frac{3}{4}$ x 2 —Corner blocks—end unit
- 2 pcs.— $\frac{3}{4}$ x 2 x $34\frac{1}{4}$ —Back strip, upper-track assembly (end unit)
- 2 pcs.— $\frac{3}{4}$ x $1\frac{1}{4}$ x $34\frac{1}{4}$ —Upper grooved track—end unit
- 1 pc.— $\frac{3}{4}$ x $36\frac{1}{4}$ x $52\frac{1}{4}$ —Center-unit base
- 2 pcs.— $\frac{5}{8}$ x $20\frac{1}{4}$ x $33\frac{1}{4}$ —Center-unit sides (1 R. and 1 L.)
- 1 pc.— $\frac{5}{8}$ x $33\frac{1}{4}$ x $51\frac{1}{2}$ —Center-unit shelf
- 1 pc.— $\frac{5}{8}$ x $7\frac{1}{8}$ x $51\frac{1}{2}$ —Center unit—long divider
- 2 pcs.— $\frac{5}{8}$ x $7\frac{1}{8}$ x $16\frac{7}{16}$ —Center unit—short dividers
- 2 pcs.— $\frac{3}{4}$ x $2\frac{3}{4}$ x $52\frac{1}{4}$ —Face spreader, upper track, center
- 2 pcs.— $\frac{3}{4}$ x 2 x $52\frac{1}{4}$ —Back strip, upper track, center unit
- 2 pcs.— $\frac{3}{4}$ x $1\frac{1}{4}$ x $52\frac{1}{4}$ —Upper-track strip, center unit
- 1 pc.— $\frac{3}{4}$ x 2 x $33\frac{1}{4}$ —Spreader, center unit
- 8 pcs.— $\frac{3}{4}$ x $1\frac{1}{2}$ x 2 —Corner blocks, center unit
- 4 pcs.— $\frac{1}{8}$ x $17\frac{3}{8}$ x $26\frac{1}{2}$ —Doors for leg cabinet
- 4 pcs.— $\frac{1}{8}$ x $17\frac{3}{8}$ x $17\frac{3}{8}$ —Doors for center cabinet
- 16 — $\frac{1}{4}$ x 10 F.H. wood screws (fasten units together)
- 8 — $\frac{3}{4}$ x 10 F.H. wood screws (table levelers)
- 4 — 2 x $\frac{1}{4}$ x 20 —R.H. stove bolts (levelers)
- 8 —Hex nuts for $\frac{1}{4}$ —20 bolts (levelers)
- 4 — $\frac{5}{8}$ x $2\frac{1}{2}$ x $2\frac{1}{2}$ —Steel corner plates (levelers)
- 4 — $\frac{3}{4}$ x 8 F.H. wood screws (strike plate, levelers)
- 4 —Spring tool holders—2 for $1\frac{1}{4}$ D. and 2 for $\frac{1}{2}$ D. (cue holders)
- 4 —R.H. wood screws—2 1 x 10 R.H. 2 $\frac{1}{2}$ x 8 R.H. (cue holders)
- 4 —Rubber or plastic-wheel casters (two with brake)
- 4 —Clothesline hooks (casters)
- 4 —Lock washers (caster stud)

are made from L-shaped steel mending plates (inside-corner type). Cut a 1-in. length from one leg of each plate and bend a $\frac{1}{4}$ -in. lip on one end of each of the cut pieces. Run a nut on each of four $\frac{1}{4}$ x 2-in. stove bolts. Enlarge the hole in the short leg of each of the mending plates. Pass the stove bolt through the enlarged hole. Run a second nut down on the bolt and solder (or attach with epoxy cement) the second nut to the plate. This latter assembly is attached to each side of each leg cabinet on the center line and about 1 in. below the lower

edge of the table side rail as in Fig. 35. Then attach the strike plates to the edges of the side rail directly above the end of the stove bolt and you end up with four assemblies like that in Fig. 35 which enable you to level the table easily.

Cues are stored under the ball tunnel as in Fig. 33. Spring tool clips are attached to the bottom of each ball tunnel at the positions indicated, the larger clip at the high end and the smaller one, which holds the cue tip, 40 in. distant.

Use $\frac{1}{8}$ -in. perforated hardboard for the sliding doors. In laying out, remember to evenly space the holes from the outside edges, Fig. 31. Note the variations in sizes of the doors. Locate and drill two $\frac{3}{4}$ -in. finger holes on each door. Smooth and slightly round all edges. In a final installment next month you will be told how to make the flip-over piggyback top which serves as a table-tennis table on one side and a model-railroad layout on the other. Complete painting and finishing instructions also will be given.

Spacemen Will Be Mechanics. Not Dashing Adventurers

Man will play second fiddle to machines in the Space Age.

"Instrumentation systems which will be built up to perform vital space functions will become so complicated and expensive that we will need men in the very inglorious role of a maintenance and repair man for complex television and communication satellites, or to the complex astronomical observatories in space," says Dr. S. F. Singer, University of Maryland physicist.

After all, he said, man is "the only non-linear, 150-pound servomechanical system which can be mass produced by unskilled labor."

"Flies" Planes on Ground For Instrument Check

By simulating flight conditions and correcting and calibrating an aircraft's instrumentation before takeoff, an analog-to-pressure converter insures near-perfect altimeter and airspeed readings once the plane is airborne.

Previously, the lowest margin of error achieved by such testing was .3 percent. The new Moletronics APC unit reduces this margin to .025 percent.

Usable on both commercial and military aircraft, the new safety device is no larger than a week-end suitcase. It also has potential in other industries.



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Space-Age World's Fair

(Continued from page 104)

One exhibitor will display an ion emission microscope so powerful that a mass consisting of only nine atoms can be detected. Magnified to the same degree, the head of a pin would cover two and a half square miles! Another exhibit is planned to demonstrate the use of air walls to provide indoor comfort in outdoor living spaces. Others include closed-circuit TV systems by which you can play chess with a distant opponent, full-wall TV screens, and heating devices woven into rugs or installed in the walls of a room.

Some of these exhibits will be displayed in the cubed facades of a "floating city" suspended inside Coliseum Century 21, a four-acre building whose massive 11-story roof has no interior supports. Entering the coliseum at ground level, visitors will ascend in a 100-passenger "bubble-ator" to the exhibit area, then stand on moving sidewalks that carry them past the displays.

... Even a Space Trip

An awe-inspiring spectacle never before created will be a simulated trip through a portion of the universe, a two-billion-light-year "travelogue" condensed into a 12-minute show.

Spectators on the ride through space will stand inside a dome 78 feet in diameter and 39 feet high that serves as a motion picture screen completely surrounding the viewers. In effect the spectators will be on board a space ship and will watch the earth recede from them as the ship slides past the moon on a "ride" through intergalactic space and other star systems. This spacearium color film will be a combination of regular photography, animation and stop motion. The film is projected to all sides of the dome by means of an ultra-wide-angle lens system that is mounted on top of a projection booth centrally located on the spacearium's floor. Floor slants in one direction to help focus attention on the central point of the show.

The spacearium structure is one of several buildings that make up the United States Science Pavilion, the \$9 million complex sponsored by the Federal Government. In the first building, the House of Science, visitors will watch a film that traces the history of science and shows how modern scientists perform their tasks.

The second building contains exhibits that show the development of science, different aspects of nature, the role of mathematics and, finally, the classic experiments on which modern science is based. The

third building, Vistas of Space, contains the spacearium. Next comes the Methods of Science building, in which are shown modern scientific methods. Next, the Horizons of Science depicts the ways in which science fits in with civilization.

Still another part of the Science Pavilion is a laboratory in which visitors will be guided in performing their own scientific experiments. The final structure is a science theater in which popular scientific lectures and films will be presented.

Something for Everyone

Century 21 Exposition is to have numerous other attractions aside from those of science. A fine arts exhibit has been assembled that includes 70 of the most famous paintings and art objects owned by top U.S. and Canadian museums. Famed orchestras, ballet companies, theatrical productions and individual artists from many nations will perform. To house these performances, an 800-seat playhouse and a 3100-seat opera and concert hall have been built.

Other entertainment, in a 5500-seat arena and a 12,000-seat stadium, will include performances by the Mexican Motorcycle Police team and in which spectacular sharpshooting exhibitions will be given, kite fighters and boxers from Thailand, the Voladores de Papantla of Mexico who swing from the top of a 100-foot pole, Chinese acrobats and the Royal Canadian Mounted Police.

Like all other fairs, Century 21 Exposition will have a gayway amusement area. A sky wheel, a bobsled ride, a Le Mans sports car course and a score of other thrilling entertainments will be available in the four acres given over to the fun zone. Off-shore, the famous French line *Liberte*, will serve as a floating hotel for 1500 people.

City Prepares for Crowds

Seattle expects that more than five million people, possibly twice that number, will visit its World's Fair this year. Among them will be the finalists from thousands of high school contests entered in the annual National Science Fair competition. If you plan to visit and want to know more about it, write to Public Information, Century 21 Exposition, Seattle 9, Wash.

The permanent structures that have been built for the fair—90 percent of the planned construction—will comprise Seattle Center when the Fair is over. It is expected that they will still be in use when the 21st Century actually rolls around for, after all, it's only 38 years away. But you can get a preview in Seattle this year. ★★ ★



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Anglers Hit the Jackpot

(Continued from page 143)

now indicate summer temperatures may not rise as high in succeeding years. Even should the cooling trend persist, the effects of the warm-water years between 1957 and 1960 will still be sufficient to provide good fishing in 1962, far superior to that which existed before. Catches of the strictly tropical fish, like barracuda, may fall, but it will take several more years to dissipate the influence of the warmth completely.

East Coast Prospects?

And what about the East Coast? Could similar currents here, shifting in some manner, bring about comparable changes? They certainly could, and with even more drastic results.

The Gulf Stream is usually considered a tropical affair, since it is most evident as it sweeps up out of the Caribbean and passes Florida. But, although its speed of four knots has dropped to the point that the main stream divides and meanders at Cape Hatteras, it is still a significant factor far to the north. In fact, its warmth helps create the great natural fishery at the Newfoundland Banks, where the current is still proceeding at 10 miles a day.

While still at a significantly higher temperature than the surrounding ocean, the Gulf Stream proceeds along the entire East Coast only a short distance offshore. The only thing intervening is a narrow counter-current called the Cold Wall by mariners and fishermen. If this cold current slackened or were overridden by the Gulf Stream, the coastal states here would be washed by water which is truly tropical. Fishing would become an amazing sport, both in the success ratio and the types caught.

Further, if this Cold Wall were somehow dispersed, exactly the same thing could happen here as happened on the West Coast—the warmer waters of the mid-ocean could move inshore, thus vitally affecting the whole situation. As for the Gulf Stream itself, Prof. J. Berknes of the University of California has found recently that this tremendous sea-going river has warmed five degrees in the last 60 years. The increase in the Stream's temperature since the turn of the century, according to Prof. Berknes, is directly related to the increase in the Bermuda High, a semipermanent high-pressure area located off these Atlantic islands. If this trend continues another few decades, its abundant tropical marine life will be carried farther and farther north.

Marlin fishing out of New York City? Not impossible. ★ ★ ★

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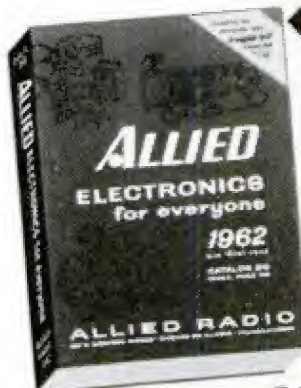
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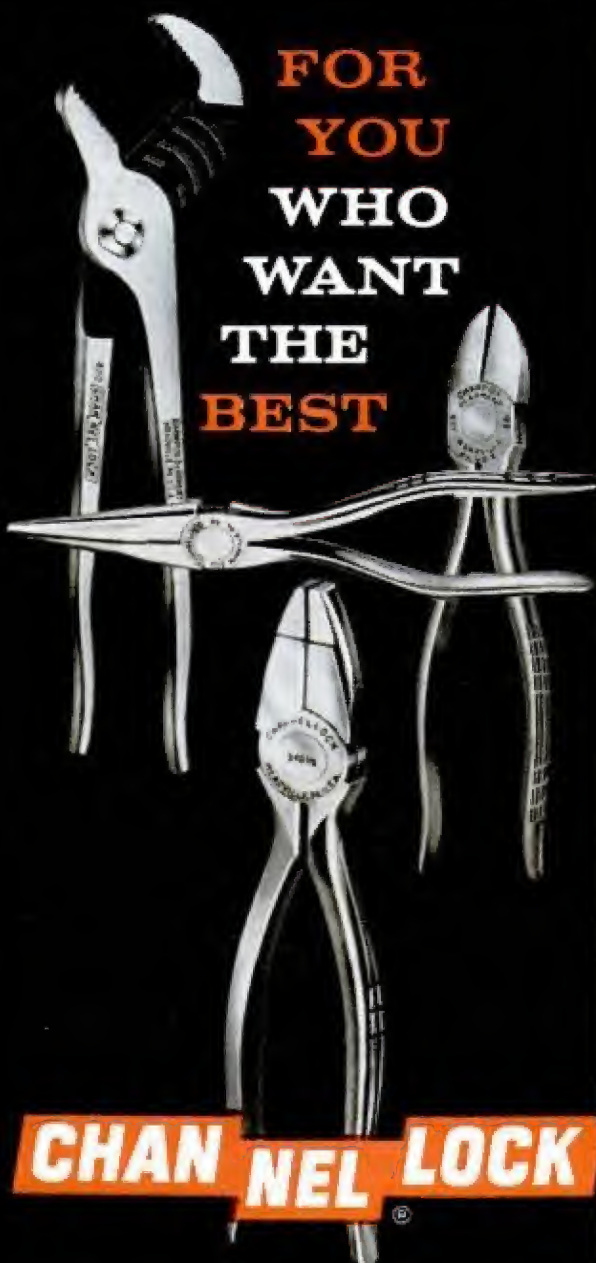
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Science Climbs the Peaks

(Continued from page 152)

hard and fast. Batteries of instruments checked things like blood pressure, pulse rate, breathing rate and reaction time. The result, according to Dr. Blake, indicated that routine conditioning may raise the allowable ceiling for pilots by several thousand feet.

Most Spectacular Laboratories

Probably the most spectacular of all the high-altitude laboratories are those hanging on the towering pinnacles of the European Alps. One of the most unbelievable is the cosmic ray lab of the International Institute of Scientific Research, crowning a spire of black rock known as "The Sphinx" atop the snowclad heights of Switzerland's Jungfrau. Surface approach to these ram-parts consists of nearly vertical rock walls, falling away in sheer drops of thousands of feet. Even cableways are impractical here. To reach the top, visitors ride a railroad that chugs up a breathtaking roadbed until it is swallowed by a yawning tunnel from which it never emerges until the return trip.

Winding upward for five miles through the black interior of the mountain, the train arrives at an underground station carved in the rock beneath the foundations of the Berghaus, a huge ski lodge. From here, the tunnel proceeds through the inside of the mountain top to a point some 500 feet beneath the Sphinx. Here, met by Herr Hans Wiederkehr, of the Institute, the visitor enters a lift. The shaftway bores up through the peak to the 11,723-foot level of a laboratory that caps the entire surface of the pinnacle like a dome on a minaret.

Precise Blasting

Herr Wiederkehr, who for 25 years has repaired and maintained everything from the Institute's telescopes and cosmic ray counters to its plumbing, watched the four-story laboratory and outbuildings grow from a wooden hut cabled to a rock ledge. He'll tell you that the last 100 feet of the lift shaft is almost as wide as the Sphinx itself. To carve it out of the rock, experts had to drill and blast with incredible precision. One poorly calculated charge could have ruptured the thin walls and brought down the entire pinnacle in an avalanche of crumbled rock.

Just as hair-raising is the Bavarian Zugspitze, a 9721-foot peak crowned by Germany's highest meteorological observatory, the *Münchner Haus*. To reach this

(Continued to page 222)

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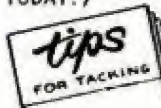
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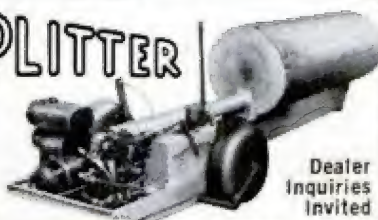
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cabin-in-the-sky, a cog railway carries visitors from the famous *Garmisch-Partenkirchen* winter sports center up a one-in-four gradient, past the azure *Eibsee* lake and into a three-mile tunnel terminating at *Schneefernerhaus*, a resort hotel. From here to the *Zugspitze* peak, cableway cars, dangling above crags and bottomless valleys, hoist people the remaining 1035 feet to the summit. Right now, men with jackhammers are drilling into the tough granite to anchor a pair of gigantic towers—one near the peak, and another near the lake village of *Eibsee*, 6000 feet below. Between them, these two towers will support a cableway 13,000 feet long. Early in 1962, two cablecars, each with a capacity of 45 passengers, will begin swinging their way back and forth along this high wire, making a one-way trip in nine minutes.

Promenade Deck

At the terminal on the peak, sometime in 1963, passengers will find themselves in a vast, enclosed promenade deck with lounge, restaurant and other plush facilities overlooking some of the most spectacular scenery in the world.

For years, most high-altitude laboratories were unknown except to a handful of scientists with a special interest in astronomy and related fields. It was in 1930, while establishing two Andean cosmic ray stations, that Dr. Korff became aware of the general lack of information about the stratospheric camps, and made his worldwide survey of them.

Daring Scientists

Many of the 46 he has listed have no permanent staff, no water, heat or power. But one place at 7000-foot altitude in Kodaikanal, India, lists a staff of 37. Another observatory in Kole Kole, Hawaii, has a single staffer who is listed as a "jack of all trades." Hazards of high, rockbound stations are listed, too. Several have a somber record. At *Sonnblick Observatory*, one resident meteorologist died in a fall on his way to the valley, some 10,000 feet below the station. Another, *Joseph Rupitsch*, succumbed to a blizzard in 1945 when he tried to save his wife who was returning up the dizzy trail from the valley. Both were found dead of exposure only 300 yards from the observatory. Until the first manned space laboratory goes into orbit, these hardy, daring men, and their spectacular Earth-bound observatories, will continue to play a heavy role in the accumulation of cosmic knowledge.

You'll be hearing more and more about them. ★★★

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(Continued from page 174)

Crankplates, Fig. 9, come next. These are disks of 14-ga. steel or $\frac{1}{8}$ -in. brass which are turned to the same diameter as the pressed-steel pulleys and then drilled and bolted to them. To make the crankplates, first saw them out roughly on a jigsaw, then turn to the proper diameter. Bore a $\frac{3}{8}$ -in. hole dead center through the disk and lay out and drill three $\frac{3}{16}$ -in. holes 120 deg. apart on a 1-in. radius. Countersink the latter holes for 1-in. flathead stove bolts. Now form the center hole into a $\frac{3}{8} \times 1\frac{1}{4}$ -in. adjustment slot. This can be done on the jigsaw or by drilling a series of overlapping holes and working out the waste with a file.

Attaching Crankplates

The holes in the crankplates are used as a guide in spotting and drilling registering holes through the faces of the pulleys. To do this, align the slot in the disk with the keyway in the pulley and clamp both together. Then, with the pulley supported over an open drill-press vise, carefully drill each hole. By aligning the slots with the keyways, the crankheads will automatically be offset 180 deg. from each other. Before the crankheads can be permanently bolted to the pulleys they must be fitted with crankpins, Fig. 9. These are made from bright-finish $\frac{3}{8}$ -in. carriage bolts slightly altered by chucking and turning down all but about $\frac{3}{32}$ in. (the thickness of the crankplate) of the square shank. This lets the shouldered bolt head seat securely in the adjustment slot. Sleeves are made by boring $\frac{5}{8}$ -in. drill rod lengthwise with a $\frac{3}{8}$ -in. drill bit. A nut and washer draw the crankpins up tight. Chisel marks spaced $\frac{1}{4}$ in. apart along the adjustment slot and numbered 1, 2, 3 and 4, will serve to vary the stroke of the massage belt from a mild to a vigorous action. In bolting the crankplates to the pulleys draw up the bolts so they draw the disks slightly concave. Use lock washers on the bolts. Polish the crankplates and pins with emery cloth followed by crocus cloth.

A lift-off sheet-metal hood, or canopy, lets you get at the motor and belt by loosening wood screws driven in the edge of the wooden base. Fig. 7 shows how the hood is made, the end covers being laid out on 20-ga. sheet metal. Tabs are left around the top edges, slots are formed along the bottom to slip under the screw heads mentioned, vents holes are drilled as indicated and cutouts are made to clear the ends of the crankshaft. You can cut out the end covers neatly by chucking a metal-cutting blade in your jigsaw. The center part of

the hood can be of lighter (26-ga.) sheet metal. Like the end covers, screw slots are formed along the lower edges, a hole is made for a toggle switch and the metal is rolled to the same curvature of the end covers. The covers are soldered to the center section with the tabs placed on the inside. Then the seam is filled on the outside with epoxy mastic. When the latter is filed smooth and the hood painted, the joints will be as neat as can be.

After cementing rubber matting to the platform, your belt massager is completed and ready to try out. The machine is designed for a regular 64-in. commercial belt having conventional leather ends. In using the machine, abdomen, hips and upper thighs are treated in a standing position, facing toward or away from the power head. To massage sore muscles in chest or upper back, sit on a stool placed on the platform. To massage the lower thighs, calves and feet, place the stool alongside the platform. Then detach the belt from the far crankhead and wrap the belt around the calf or foot. Take up the slack by holding the free end and start the motor.

Abdominal Board

The abdominal board is nothing more than a board inclined at one end on which the person lies on his back, head down and the feet hooked under a strap at the head of the board. Exercising consists of touching the toes with the hands from a sitting position, then lying on the back to a rhythmic count. The easiest of all your equipment to make, Fig. 10 shows how you start off with a plywood board 20 in. wide and 72 in. long. All edges are rounded and sanded smooth. Stiffeners of aluminum angle or 1 x 2 strips are screwed to the underside, a cleat with dowel legs attached is screwed to one end and a leg strap attached. The latter can be of anything handy; a length of web belting is fine. It is tailored to the person by passing it across the ankles while sitting on the board and then securing the ends to the underside with washers and screws. An optional but worthwhile feature of the board is a vibrator motor. This is bolted to the underside of the board with the nuts flush in counterbored holes. Ten minutes spent relaxing stretched out on the abdominal board with the vibrator plugged in will make you feel like you're floating on air.

Fig. 11 details still another piece of equipment for your home fitness gym. This simple exerciser makes use of weights to condition the body from a standing, sitting or lying position. As shown, it features a slide bar which is weighted with bar-bell

(Continued to page 226)



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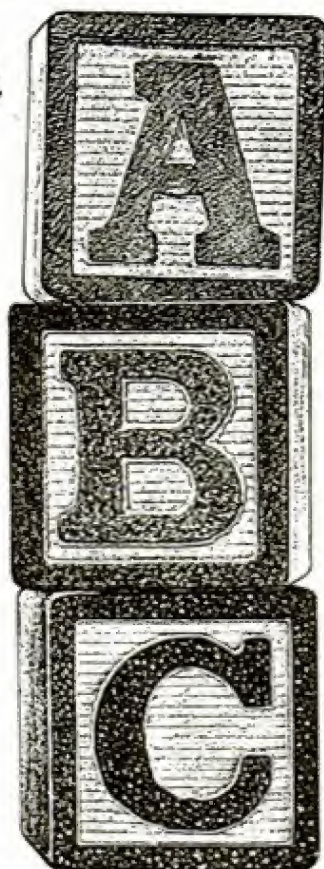
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disks and used as a leg exerciser from a prone position by raising the bar with the feet. Weights at the end of a pulley-and-cord arrangement provide beneficial leg, back and arm exercises from both a standing and sitting position. And when equipped with a padded board elevated at one end by resting it on the slide bar, the exerciser has its own abdominal board. Fence fittings called Nu-Rail wall flanges are attached to the ends of the slide bar and slip over regular 1¼-in. pipe standards which screw into common pipe flanges attached securely to a plywood base. A length of wooden closet pole with an eyebolt through it to hold an awning pulley is supported at the top by fence parts called swivels. A spindle to hold the weights on the slide bar consists of a waste nut and a pipe nipple. A second spindle which is used free of the bar consists of the same parts but with the end of the nipple flattened and drilled for attaching to a length of cord fitted with a snap. The cord is passed over the pulley and a hand and foot yoke are formed at the end by passing the cord through a 5-in. section of ½-in. pipe. Screweyes at each end of the slide bar permit a knee strap to be snapped to them for use with the abdominal board. ★ ★ ★

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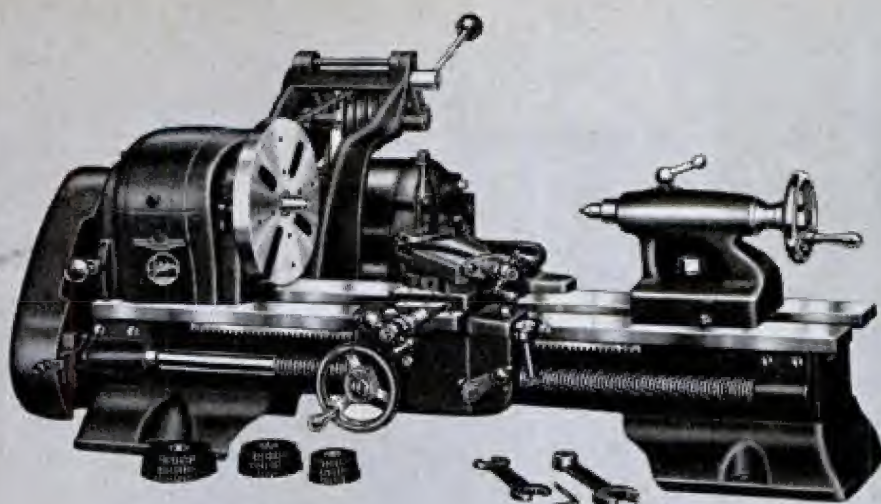
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C-8

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Adventure in Your Crankcase

(Continued from page 121)

the trailers at night. Even so, the men can work in the desert only four weeks at a stretch, taking a week off to "dry out" at a port city before returning to the scorching sands of the "empty quarter."

Jungles Too Cold

An ironic twist occurs in the steaming South American jungles, where it is simply not hot enough. Pan American crews in Argentina and Richmond Exploration Company crews in Venezuela have to set up intermediate heater stations along pipelines because the oil there is too thick and heavy to flow smoothly between the wells and the port where it is loaded on tankers. It has to be warmed to about 180 degrees to make it fluid enough to pump.

This irony has its parallel in the Arctic regions where oilmen have to wait for the coldest weather to get their best work done. In summer, the ground thaws and becomes too mushy to use and, if there are any rivers to cross, they are usually too wild and high from the winter snows. Drilling time usually starts after January 1, and it sometimes takes three winters to complete a job.

Bridges of Ice

Even in winter, when the ground is frozen solid, rivers still have to be reckoned with. Pan American solved this problem in its Beaver River project in northern British Columbia, across the border from Yukon Territory where the lowest temperature in North America (81 degrees below zero) has been recorded. To move heavy equipment to the well site, two rivers had to be crossed, both swift and a half-mile wide. So ice bridges were built by flooding water over 60-foot logs laid side by side on the rivers. After January 1, the rivers and the bridges froze solid.

Behind—or, more accurately, beneath the problem of waiting for winter to drill in northern Canada is the frightening nature of the ground itself when unfrozen. More than a half-million square miles—more than the total area of France and both Germanies—consists of a spongy, treacherously deep mixture of water and dead vegetation that supports nothing, spreads like cancer, and devours everything. It is called muskeg. The heavier the load, the more apt it is to sink out of sight, as engineers building the Alaskan highway found as they watched ton after ton of fill disappear. Perhaps the most surprising thing about muskeg is that it hasn't been used by Hollywood as the basis of a horror film. Muskeg,

more than the cold, has bogged down the development of northern Canada and, if it didn't freeze once a year, the area would be totally undeveloped today. Yet there is oil beneath all that goo, and Imperial crews have helped pioneer trails through some of the thinner layers of muskeg (which can run as deep as 30 feet). They use helicopters as advanced scouts and recently developed muskeg buggies as ground vehicles. Currently the "Musk-Ox," a 20-ton monster with tracks 10-feet wide, is the most practical muskeg vehicle, being able to haul up to 15 tons of equipment over the mush.

Vanishing Islands

Muskeg has a cousin in the "vanishing islands" of South America. Royal Dutch/Shell Company crews in Columbia have been dismayed to find their operations on islands in the Magdalena River disrupted by another freak of Nature. At floodstage, the river eroded the islands completely, moving them several miles downstream and creating an altogether new topographical arrangement.

Using "Dutch mats," an idea borrowed from the Netherlands where the mats are used to keep the dikes in place, the oilmen kept their islands from traveling by braiding huge 80-by-50-foot mats from brushwood and covering the banks with them, with part of the mats extending into the river. The mats were then weighted down and completely covered with rocks. The rocks on the bank were then covered over with gravel and sand, while those below the water were covered with asphalt.

The sturdy Dutch mats kept the over-all contours of the islands intact, and were flexible enough to hug the shores after any minor erosions.

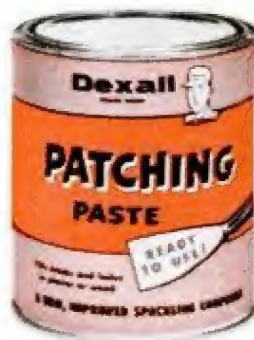
Giant Grizzlies

Imperial Oil crews, however, probably had the most unusual encounter with Nature, when they entered a pocket valley in the relatively untouched and highly inaccessible Swan Hills of northern Alberta. Here they stumbled upon the last survivors of a race of giants—the plains grizzlies that swarmed over much of the West before civilization drove them into isolation. Hiding for more than a century, they were understandably perturbed at this new trespass upon their domain and, second in size only to the Alaskan Kodiak bear, they had the equipment to put up a protest.

Many oilmen scurried for cover at the sight of these bears and many bears had to be shot in self-defense—including the "King of Goose Mountain," a half-ton colossus measuring 10 feet from nose to hind paws.

(Continued to page 234)

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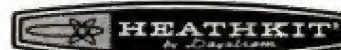
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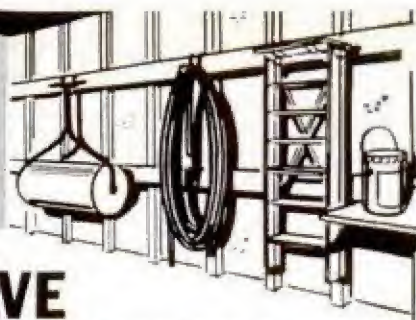
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(Continued from page 229)

A conservationist finally convinced the crews that they were destroying the last remnants (about 400 left) of one of Nature's rare breeds. Now the oilmen help spot and tag the bears—capturing them in homemade steel-culvert traps, knocking them out with liquid ether, weighing them and tagging their ears—in a cooperative effort with conservationists. And, to ward off sadistic bear hunters, the Alberta government has placed the Swan Hills area off limits.

Man, not nature, created the most dangerous oil hunt of all by starting World War II. During it more than four million land mines were buried in the North African desert by the armies of Rommel and Montgomery. Today more than three million of them are believed to be still there, waiting to be stepped on. It's in this area, specifically northern Libya, that crews of Esso Standard gingerly tiptoed looking for oil.

Leaping Mines

Armed with mine detectors, they moved in on foot, clearing safe lanes for the heavier equipment by finding and exploding mines which, buried beneath the dry sand, were as deadly as the day they were set nearly two decades ago. Included among them were British antitank mines and German antitroop mines (which leap three feet in the air before exploding to spread their splinters of shrapnel over a much larger area). These will kill or wound everything within a 200-yard radius. Crewmen also located glass and plastic mines extremely difficult to find because they have only one piece of metal—a pin—to which the detectors are sensitive.

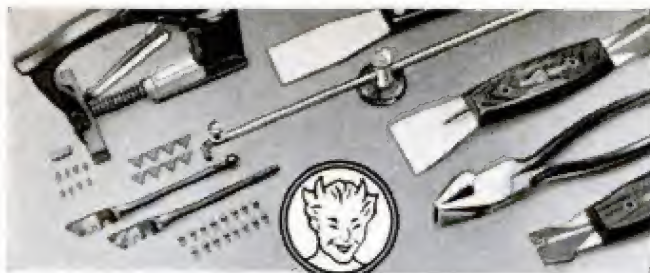
Libya, again only incidentally, had the highest official recorded temperature in history, 136 degrees F. at El Azizia.

Heat, cold, mountains, valleys, above the water and below it, into areas and dangers few men have encountered before—these are all part of an oilman's life. So next time a drop of oil drips from your car's crankcase, remember it took some adventure to get it there. ★★★

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Weapons for the Little Wars

(Continued from page 111)

gon last Spring created a Limited Warfare Systems Office to cope with it. It has already made over 100 recommendations for improvement.

Vehicles must be more at home in swamps than on highways, says the Limited Warfare Systems Office. Thus, the Navy is developing a new armor-plated swamp boat; the Army is modifying some of its equipment until it can come up with new designs. Supply planes have to land in small clearings rather than on long, paved runways. For this reason, some of the first of the new Canadian-built Caribou transports have been rushed from the factory directly to Vietnam. The Caribou carries 24 paratroopers or three tons of supplies. It lands and takes off on very short, crude runways.

The helicopter can be used to spray jungles with newly developed defoliants. These agents cause trees and shrubs to drop their leaves within two or three days after spraying. So far, the Chemical Corps has developed three or four effective defoliants, all based on commercial weed killers. One use would be to spray wide areas—many miles—to discourage guerrilla activity by stripping away the protective cover of leaves. Another use is to create leafless protective rings around villages and cities.

Chemical Corps scientists are working hard now to improve the defoliants. They seek an agent that can be used in small quantities over wide areas, yet strip leaves in just a few hours.

Another spray has an entirely different use. Many Red guerrillas are raiders by night, but farmers or laborers by day. They may even be persons trusted by the anti-guerrilla forces. How do you spot them?

The Telltale Stain

During night raids, guerrillas will be attacked with flame throwers, modified to squirt water with an indelible dye added. The next day, antiguerrilla forces will search for persons stained with bright dye. It cannot be washed off. The Chemical Corps has also developed "invisible" dyes similar to those used by police to mark money for tracing. Supply dumps, bridges and other equipment or structures that are possible sabotage targets are painted with the dyes. Following trouble, suspects' hands are exposed to ultraviolet light and examined for traces of the dye.

One of the most effective weapons against guerrillas is fire—burn them out of the

(Continued to page 238)

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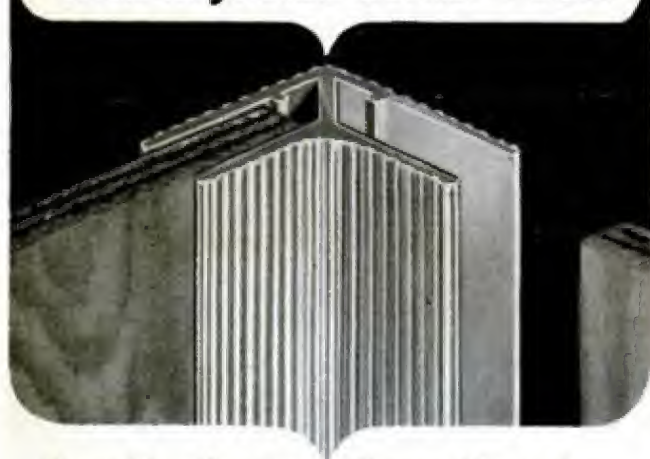
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brush. Almost any American or Allied fighting unit usually has on hand plenty of gasoline and packets of a thickening powder developed by the Chemical Corps. When a small amount of powder is added to a large quantity of gasoline, the liquid thickens to a jelly called napalm. This is often used in emergencies in five-gallon cans rigged as antipersonnel mines. Or napalm-filled drums are rolled toward an enemy and exploded, sending flying sheets of flame in every direction.

The napalm is easy to come by; the problems are in fusing it for use. Field forces use all sorts of tricks to make the containers explode and spread the flaming napalm—sticks of TNT, blasting caps, windings of primacord and even delicately balanced hand grenades. Much of the time, these field-rigged napalm weapons do not work; often they are as dangerous to the makers as to the enemy. The Chemical Corps has developed a small, lightweight exploding stick to be used in field-rigged napalm weapons.

The incendiary burster is 12 inches long and contains two plastic tubes of explosives that can be safely detonated by ordinary fuses or blasting caps. It bursts the napalm containers, ignites the fuel and scatters flames over a wide area. The bursters are small, light and rugged enough for anti-guerrilla units constantly on the move.

New Forms of Cats' Eyes

The Army Corps of Engineers has developed a new type of image intensifier that needs no electrical input, and does not use infrared. The problem with infrared devices is that an enemy with infrared goggles can clearly see each of our devices. The problem with electronic image intensifier tubes, such as the widely publicized "cat eye," is that they require a heavy, bulky power supply for their operation.

A new "cascaded image intensifier" tube operates in much the same manner as the cat eye, but it draws its power from moonlight, starlight or even just "skyglow." The Engineer Research and Development Laboratories near Washington, D.C., is now working to make the system small enough to mount on a weapon in place of the infrared sniper scope. This will be a device designed specifically for fast-moving night action against guerrillas.

3-D Maps

Another development is now ready for use by Special Forces and our Allies. It is a three-dimensional plastic map that can be rolled or folded to fit a pocket. A map where the hills actually stick up and the

(Continued to page 240)

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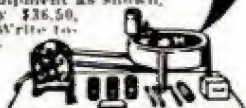
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Make your own Gems 36⁵⁰

The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only \$36.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

B&I MANUFACTURING CO.
Dept. P, Burlington, Wis.



Keep Tools in Tip-Top Condition

Lubricate • Clean • Prevent Rust

3-IN-ONE® OIL

REGULAR-OIL SPRAY-ELECTRIC MOTOR

Jump Drum, a kiddies' bounce tumbler made from an old tire and plastic clothesline. See it in the March PM.



My Daddy says it's
easy to paint a
basement with a
HYDE Spray Painter

It's easy to spray-paint basement walls, floors, outside of houses, boats, swimming pools, equipment, fences, shutters, outdoor furniture with the Hyde Spray Painter. A Low Pressure System, sprays all paints right from manufacturer's quart paint can. Gun fastens to exhaust outlet of canister or tank-type vacuum cleaner or Hyde Electric Air Blower. Spray Painter retails for \$12.95. Steel carrying case with Spray Painter and Hyde Electric Air Blower, complete for \$73.40. See Hyde's complete selection of Putty Knives, Wall Scrapers, Paint Scrapers and other Take It Off — Put It On Paint Tools in paint, hardware, building supply and lumber yard stores. Write for Free Pocket Catalog and How-To Book.

HYDE TOOLS

SINCE 1875

Dept. PM 2

SOUTHBIDGE, MASS., U. S. A.

Buy Your

WINCH

as Carefully as
You Buy Your

TRUCK!

Buy the *right* winch for the *right* truck. Buy a BRADEN Winch and be sure. BRADEN... considered the leader in winch manufacturing... has pioneered more improvements in winch design than any other company. BRADEN'S Oil Cooled, Fully Automatic Safety Brake, for example, has never been equalled for quality and safety. If you buy your winch as carefully as you buy your truck, you'll insist on BRADEN.

Look in the Yellow Pages for name of your BRADEN Winch distributor, or write direct to the factory for complete information.

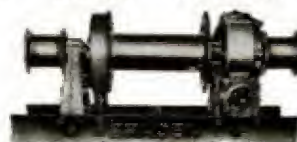
Nation-wide Service Available on all BRADEN Winch Products

BRADEN WINCH

LYNN LANE AND DALLAS AVE. • BROKEN ARROW, OKLAHOMA

BRADEN

Your BEST Winch Buy



UPRIGHT MODELS — Designed for behind cab mounting. Capacities from 8,000 to 100,000 lbs.

UNDERSLUNG MODELS — Range from 8,000 to 30,000 lbs. capacity. For front end mounting.

FRICTION CLUTCH MODELS — Capacities range from 5,000 to 16,000 lbs. Ideal for small trucks.

SPECIAL MODELS — Constant load, constant speed model specially designed for electric utility and telephone industry application.



don't say "darn"...say

DAP®

KWIK-SEAL®

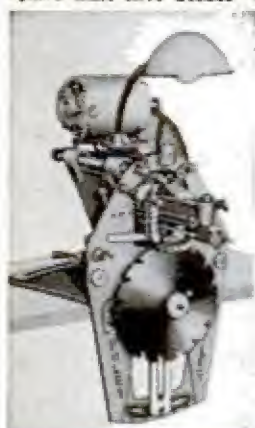


New rubber-like sealer makes it easy for you to put a neat, white, waterproof joint around tub, sink, shower, lavatory. Resets loose or broken tiles, too. Handy squeeze tube. Get DAP Kwik-Seal for longer-lasting jobs.

DAP inc. • Dayton 31, Ohio

Make \$20 to \$30 a Week EXTRA MONEY!

With the high prices of food, clothing and everything else, just think what you could do with extra money every week! Turn your spare time into CASH—sharpening saws with a Foley Automatic



Saw Filer pays from \$3 to \$6 an hour. Start in your basement or garage—no experience necessary. "The first saw I sharpened with my Foley Filer came out 100%," writes Clarence E. Parsons. No canvassing—"I advertised in our local paper and got in 93 saws—says M. L. Thompson. With a new model 200 Foley you can file all hand saws, also band and both combination and crosscut circular saws.

FREE BOOK Shows How to Start

It explains how you can get business from home owners, farmers, carpenters, schools, factories, etc. "I get work from 20 and 30 miles away"—says Charles H. Smith. Free Book, "Money Making Facts," tells how to start. Time Payment Plan. Send coupon today—no salesman will call.

Send Coupon for **FREE BOOK**

FOLEY MFG. CO.
216-2 Foley Bldg., Minneapolis 18, Minn.

Send **FREE BOOK**—"Money Making Facts,"
and Time Payment Plan.

Name _____

Address _____



valleys are real depressions is a great help to poorly educated native troops. Such maps had existed only at high headquarters since they could not be folded.

The new map can be rolled or folded for travel. When unfolded, the plastic mountains pop right back into place.

The Army's research and development office is now studying several designs of "floating wheelbarrows." These will be man-powered, one-wheel carts capable of being pushed easily over any kind of terrain and floated over swamps. The lightweight wheelbarrows will solve the problem of transporting heavy loads where vehicles cannot move.

The R & D office also seeks an all-purpose adhesive that can be used to fasten demolitions to any surface, wet or dry. It will mean that Special Forces demolitions specialists will carry only one adhesive instead of several.

Tactics Changing

One major change may be in guerrilla-fighting tactics. Now, counter-guerrilla groups are roving bands that catch guerrillas where they find them.

New tactics call for independent, self-contained groups of about 50 men each. The groups would be spread through guerrilla-infested country and operate as follows:

A guerrilla-infested part of the country is marked off and divided into sections. Each section is patrolled by one of these units, but all are in contact with a central headquarters, which in turn has a reserve force at its disposal. Upon contacting guerrillas, a patrol alerts headquarters and adjacent patrols. As the latter converge, headquarters dispatches paratroops or helicopter transports behind the enemy, who is surrounded and destroyed. Once an area is pacified, the government consolidates its control and moves its forces on to the next section of land to be cleared.

The keys to success here are constant patrols, good communication facilities, rapid mobility, and capacity for rapid concentration.

The guerrilla's traditional way of living off the countryside may be on the way out. Chinese Communist boss Mao Tse-tung contends that guerrillas are like fish and the local population is the sea in which the fish must swim. With the new Allied tactics the 50-man detachments will be well-supplied by air, leaving nothing to be drawn from the native population.

With new tactics and new weapons, the Allies are at last finding ways to fight the small brush wars—and win. ★ ★ ★

END NUT and BOLT HANGOVERS

DOT Teenuts

Can't Slip ... Steel Threads in Wood
Flush-Mounted ... Strong ... Versatile!
The One Nut That Makes Sense!



Ideal for permanent work or where easy "knock-down" feature is wanted. Available to fit standard thread bolt sizes: 6-32, 8-32, 10-24, 10-32, 1/4-20, 5/16-18, 3/8-16. Available at

hardware dealers. If not, send \$1 for special mail order package and name of nearest distributor. Specify size.

COLUMBIA FASTENER COMPANY
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GUNK® removes grease like no detergent can!



Cleans power mowers, engines, garage floors, kitchen walls, ovens, exhaust ducts, paint brushes, furnace filters, bar-b-q grills, machinery! At auto supply, farm, or hardware stores!

GUNK CHICAGO CO., River Forest, Ill., serving the Midwest and Southwest
RADIATOR SPECIALTY CO., Charlotte, N.C., serving the East, Southeast and far West



Instant Ink! Just Add Water

Just dip a fountain pen into a glass of water, or hold it under a faucet, and in 30 seconds you have a full pen.

A new instant-ink capsule holds an ink concentrate sandwiched between thin sponge layers. When water is drawn through it, the capsule dissolves, producing a solution of ink.

Capsules are sold at three for 29 cents for Parker Pen's 61 models.

FEBRUARY 1962

**2
New**

RIGID Tubing Cutters

Give you Grooved Rollers for close flare cut-offs ... no waste! Also, Enclosed Feed Mechanism • Spare Cutter Wheel in Handle •



Fold-in Reamer

RIGID No. 205 Tubing Cutter

Time-Saving, Slide-to-Size 1/8" to 2 3/8" O.D. Capacity

Made of lightweight, high-strength cast aluminum alloy, you'll find these new RIGID Tubing Cutters extra handy. Slight push on handle of large-size-range RIGID No. 205 snugs cutter wheel against tubing ... locks it in position until released. Feed screw fully protected and enclosed ... always feeds into tube with easy handle turn ... can't jam with chips or dirt. Wheel gives quick, clean cuts of copper, brass, aluminum tubing and thin-wall conduit ... no burr. Grooved rollers give easy flare cut-offs without tubing waste. Tubing always turns freely on 2 of 4 Rollers. Rollers smooth tubing ready for soldering. Fold-in reamer always handy. Spare Cutter wheel in handle. Wheel for plastic and aluminum pipe available for No. 205 only.

Conform to Fed. Spec. GGG-C-771b Type II—
Class I—enclosed feed mechanism

RIGID No. 105 Tubing Cutter



Protected Feed
Screw Always
Easy-Turning
1/8" to 1 1/8" O.D.
Capacity

Save time on home maintenance and workshop projects; get a RIGID Tubing Cutter from your Dealer today!

RIGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

You've never seen a **THE *NEW***

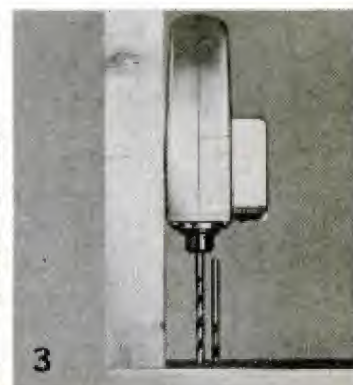


\$30⁰⁰

Only a nickel
more than the
next best drill

power drill like it before: **DISSTON 1/4" DIRK!**

"The unusual design makes sense. With your hand directly behind the bit, you can drill straighter, apply more muscle on tough boring jobs and eliminate the wobble that breaks bits and gives you oval holes," says a well-known handyman's magazine.



1. POWER. The Disston Dirk has a full 3-amp motor (1800 rpm) with Spiroid® gearing. It's one of the most powerful drills in its price class. These gears have more teeth in simultaneous contact than any other right angle gears. Plus, the Disston Dirk also has a built-in chip blower — and a three-wire safety cord.

2. EXCLUSIVE! A STAND-UP BASE. It's the only drill with a stand-up base, makes it easier to change bits. Drill bits won't break or bend when you set the unit aside because the Dirk is always in an upright position.

3. YOU CAN SNEAK IT INTO CORNERS. It's the only drill with an offset motor and a recessed Jacobs chuck. This gives the working end the slimmest profile available. You can also work between joists and get closer to floors and ceilings. (Note bit clearance required by conventional drills.)

Look for the new Disston Dirk 1/4-inch drill in your local hardware store. It's priced at \$30.00, only a nickel more than the next best drill. When you see it and try it, you'll want to buy it. The Dirk, made in Danville, Virginia, is another fine product from Disston, master toolmaker since 1840.

PORTER

**DISSTON DIVISION
H. K. PORTER COMPANY, INC.**

**FOR COMPLETE COST AND PRODUCT INFORMATION
ON THE PM VACATION HOME...**

**VISIT THESE POPULAR MECHANICS COOPERATING
IDEA PROJECT INFORMATION CENTERS**



WATCH FOR THIS SYMBOL ON THE DOOR

The lumber and building supply dealers listed below, and who display the Idea Project symbol, are the best sources in your area for further product and cost information on the PM Vacation Home. We highly recommend their services to you—for this and other Idea Projects you'll see in Popular Mechanics during the coming year.

ALABAMA
Jasper
North Alabama Lumber Co.
201 West 22nd St.

ARIZONA
Scottsdale
Hamman McFarland Lumber Co.
6425 East Thomas Road

CALIFORNIA
Marysville
Speckert Building Supplies, Inc.

COLORADO
Sterling
Broadway Lumber Co.
101 Broadway

Wheatridge
Wheatridge Lumber Co.
8995 West 44th

CONNECTICUT
Hamden
Centerville Lumber Inc.
2308 Whitney Ave.

IDAHO
Idaho Falls
Bonneville Lumber Co.

ILLINOIS
Blue Mound
Blue Mound Lumber Co.

Cambridge
Clifford & Clifford

Chicago
Gee Company
2600 West 79th St.

Fulton
Brinkman & Pessman Lumber Co.
R. R. 1

Joliet
Cash & Carry Lumber Co.
816 South Gardner St.

I. N. R. Beatty Lumber Co.
North Broadway & Chaney

Marseilles
I. N. R. Beatty Lumber Co.
322 Main St.

Morris
I. N. R. Beatty Lumber Co.
824 Liberty Street

Mt. Olive
Ervin J. Niemann Lumber Co.
500 East 1st South Street

Oak Lawn
I. N. R. Beatty Lumber Co.
9537 South 52nd Avenue

I. N. R. Beatty Lumber Co.
5167 West 95th Street

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I. N. R. Beatty Lumber Co.
9730 143rd Street

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I. N. R. Beatty Lumber Co.
703 East Howard Street

Tinley Park
I. N. R. Beatty Lumber Co.
6721 North Street

Watseka
Mackemer & McBroom
123 West Walnut

Wilmington
I. N. R. Beatty Lumber Co.
Kankakee Street

INDIANA
Decatur
Arnold Lumber Co., Inc.
425 South Winchester St.

East Chicago
Indiana Harbor Lumber & Coal Co. Inc.
3440 Watling Street

Frankfort
Kramer Brothers Lumber Co.
608 West Washington St.

Gary
Grant Street Lumber & Supply Co.
3883 Grant Street

Portage
Willow Creek Lumber Co.

Valparaiso
Smith-Nuppnau Company
360 Indiana Avenue

IOWA
Algona
Ready Mix Concrete & Lumber Co.

Carroll
Kanne Lumber & Supply Co.
814 West Ninth

Marshalltown
Marshall Lumber
312 South 1 Avenue

Waterloo
Shepherd Lumber Co.
1162 East Fourth

KANSAS
Argonia
Mack-Welling Lumber & Supply Co.

Bogue
Mack-Welling Lumber & Supply

Collyer
Mack-Welling Lumber & Supply Co.

Garnett
Star Grain & Lumber Co.

Horton
Horton Lumber Co., Inc.

Kansas City
Logan-Moore Lumber Co.
47th & Mission Road

Mack Lumber Co., Inc.
26th & Metropolitan Ave.

Lawrence
Logan-Moore Lumber Co.

Lucas
Mack-Welling Lumber & Supply Co.

Luray
Mack-Welling Lumber & Supply Co.

Marion
Mack-Welling Lumber & Supply Co.

Natoma
Mack-Welling Lumber & Supply Co.

Palco
Mack-Welling Lumber & Supply Co.

Plainville
Mack-Welling Lumber & Supply Co.

Pratt
W. R. Green Lumber Co.
803 North Main Street

Quinter
Mack-Welling Lumber & Supply Co.

Russell
Mack-Welling Lumber & Supply Co.
122 East Seventh Street

KENTUCKY
Ashland
Patton Lumber Co.
53rd Winchester Avenue

Burlington
Burlington Lumber & Building Supply, Inc.
#2 East Park Drive

Pikeville
Pauley Lumber Co.

MICHIGAN
Birmingham
Erb-Restrick Lumber Co.
425 South Eton

Detroit
Mohawk Lumber & Supply Co.
East Side Yard
11500 East Eight Mile Rd.

Mohawk Lumber & Supply Co.
West Side Yard
14525 West Chicago Ave.

Escanaba
Stegath Lumber Co.
1812 Ludington Street

Lincoln Park
Mohawk Lumber & Supply Co.
Lincoln Park Yard
2172 Dix Avenue near Southfield

Livonia
Mohawk Lumber & Supply Co.
Livonia Yard
33600 Plymouth Road

Roseville
Mohawk Lumber & Supply Co.
Roseville Yard
26640 Gratiot Avenue

Royal Oak
Erb-Restrick Lumber Co.
803 South Main

Unionville
Unionville Lumber Co.

MINNESOTA
Bigfork
Westby Lumber Co.

Butterfield
W. E. Schrader Lumber Co.

Hopkins
Justus Lumber Co.
2 Excelsior Avenue, East

Kasson
Kasson Lumber Co.

Litchfield
Ideal Lumber Co.

Minneapolis
Crystal Lumber & Millwork Co.
5353 Lakeland Ave.

Lowry Lumber Co.
111 Lowry Avenue

St. Paul
S. Berglund Lumber Co.
1171 North Snelling Ave.

South St. Paul
Farmers Supply Company
1030 North Concord

MISSOURI
Butler
Logan-Moore Building Material Co.

Carrollton
J. E. Waddill Lumber Co.
110 East Benton

Kirkville
Adair Lumber Co.
122 South Elson

La Belle
La Belle Lumber Co.

La Plata
La Plata Lumber Co.

Lewiston
Lewiston Lumber Co.

Maryville
Maryville Lumber Co.
315 North Market

Milan
Charles Rice Lumber Co.

Salisbury
Logan-Moore Lumber Co.

Vandalia
White Lumber Co.
310 South Main

MONTANA
Missoula
Wright Lumber Co.
Hiway #10 West

NEBRASKA
Burwell
Burwell Lumber Co.

Millard
Millard Lumber & Grain Co.
305 South Fifth

North Platte
Field-Blrge Co.
101 West Front Street

Waltham Lumber Co.
800 East Front

NEW MEXICO
Hollywood
C & L Lumber & Supply

NEW YORK
Brooklyn
Gem Lumber Co.
286 Ninth Street
(Between 4 and 5 Avenues)

NORTH CAROLINA
Carrboro
Fitch Lumber Co.
309 Greensboro Street

Dunn
Nu-Home Builders Supply Co., Inc.

NORTH DAKOTA

Anamoose
Herlinger Lumber Co.
Grand Forks
Ireland's Lumber Yard
123 North Sixth Street
Jamestown
M. Mooney Lumber Co.
Sharon
Johnson-Sizer Co.
369 South Dock Avenue

OHIO

Canton
The DeVille Lumber Co.
1225 Gross Avenue, N. E.
Cleveland
The West End Lumber Co.
7517 Lorain Ave.
The West End Lumber Co.
4123 Pearl Road
Cleveland, Ohio
The West End Lumber Co.
4520 West 130th Street

Coshocton

Muskingum Valley
Lumber Co.
1247 East Main Street

Hamler

Panning Lumber Co.
625 Belton Street

Uniopolis

Shaw Lumber Co.

OKLAHOMA

Tulsa
Dale Carter Lumber Co.
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PENNSYLVANIA

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R. C. Cramer Lumber Co.
320 North Courtland St.

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Lumber & Supply Co.
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Seale Amerson Lumber &
Building Co.
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Chickasaw Lumber Co.
2701 West Vickery
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Maynor Lumber Co.
6316 Mykawa Road
Midland
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1801 West Industrial
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West End Lumber Co.
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San Marcos
Tuttle Lumber Co.
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Virginia Beach
Virginia Beach Lumber &
Supply
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SATIN-CHROME MICROMETERS

Like jewels, Starrett SATIN-CHROME Micrometers have superior design and gem-like sparkle in detail and finish.

Precise, easy readability is assured with crisp, black, straight-line graduations and figures.

The knurled ring-type locknut securely locks the spindle without disturbing the setting or distorting the spindle.

Lapped, high-micro finish on the anvil and spindle, together with hardened and ground threads on the one-piece spindle, are added features assuring the highest degree of accuracy and lasting precision.

Ask your Industrial Supply Distributor or tool dealer to demonstrate these and many other precision features . . . or write for Catalog No. 27. Please use the coupon.

**STARRETT TOOLS are carried by
leading Industrial Supply Distributors
and Hardware Tool Stores.**

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Dept. AP, Athol, Massachusetts, U. S. A.

Please send my free copy of Starrett Catalog
No. 27 describing Starrett SATIN-CHROME Micro-
meters and over 3000 other fine precision tools.

Name

Occupation

Address

City Zone State

Valances Are Air Conditioners

Copper sheet with built-in tubing is the basis of the new Reflectotherm heating and cooling system originated by Dr. Clarence Mills of the University of Cincinnati. It has been tested in a home and an office for three years.

Decorative valance strips made of Revere Copper Tube-in-Strip carry warm and cold water for radiant heating and cooling. Fresh, clean air is introduced under low pressure by a separate ventilating system.

Winter comfort was achieved at air temperatures 8 to 10 degrees below those needed for warm-air-heated structures with a fuel saving of 40 percent, according to the tests.

Mobile Vans for Heart Exams

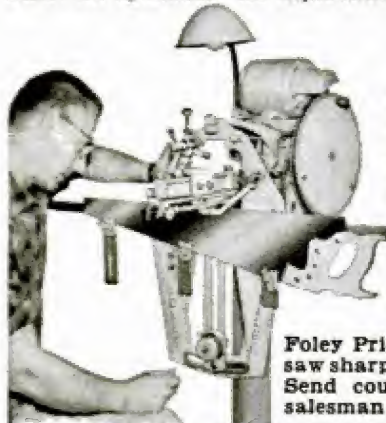
Similar to the vans that travel from community to community giving free chest X rays to discover tuberculosis, new mobile vans may give "assembly line" heart tests.

A program proposed by International Business Machines would involve making mass tape recordings of heart sounds, which would then be fed into a computer and analyzed.

The chief benefit of the program, as in the TB tests, would be to discover unsuspected heart abnormalities. Those who have them could then be referred to the family doctor or heart specialist. A pilot study showed four of every 1000 children had undiscovered heart defects.

FREE PLAN tells how to start your own business FILING SAWS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time and make up to \$3 or \$6 an hour. You can file hand, band and both combination and cross-cut circular saws on the Foley Saw Filer. No eyestrain—no experience needed. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons.



Every saw you sharpen with the Foley Saw Filer brings you more customers. "I rented a two-car garage and have all the work I can do"—Charles H. Smith.

FREE BOOK Shows How to Start

Foley Price Guide gives saw sharpening charges. Send coupon today. No salesman will call.

Send Coupon for FREE BOOK

FOLEY MFG. CO.
243-2 Foley Bldg., Minneapolis 18, Minnesota.
Send FREE BOOK—"Money Making Facts,"
and Time Payment Plan.

Name.....

Address.....



palley's FALL-OUT SHELTER BUYS

PORTABLE 2000 WATT POWER PLANT

An efficient and dependable power source for Fall-out Shelters, Farms, Garages, etc. Will supply all electric power needs up to 2000 Watts. Generator rated at 28 V. DC, at 70 Amps at 3600 RPM. Comes equipped with a voltage regulator and a volt meter. Rope start or push button start with a 24 volt battery (battery not included). Engine is a single cylinder, air-cooled 2-cycle type and is direct coupled to the generator. Size: 21-1/4" x 8-1/2" x 18-1/2". Entire unit easily portable. Originally made for the U.S. Air Force. SAVE No. HLM-2000 *****



**NOW
\$89.00**

Stainless Steel TANKS for FALL-OUT SHELTER •

JEEP • TRUCK • FARM or GARAGE •

IDEAL FOR WATER • AIR • OXYGEN or CHEMICALS

Type G-1 — An excellent storage tank for emergency drinking water, fuel, etc. Has 1/4" ports. Capacity 2100 cubic inches or 9 gallons. Tested to 400 PSI.

Order No. G-1 Excellent condition **1195 EA**

Type J-1 Large Volume TANKS — Same as above but holds 18,000 cu. in. of air or 77 gallons of liquid. Size: 45" long x 24" dia. 400 PSI test. No. J-1 — worth \$400 **9500**



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Factory Closeouts and Hard-to-Find Bargains!

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palley's

2263 E. VERNON AVE., Dept. PM-22
LOS ANGELES 58, CALIFORNIA

Owners Report on the Plymouth

(Continued from page 99)

car." — Alabama wire-weaving supervisor.

"The top is entirely too low. The windshield is entirely too close to passengers." — South Dakota farmer.

For some yes, but that 43-degree slope cuts wind resistance and saves gas at turnpike speeds.

"For use in my funeral business, my wagon is about 12 inches too short from behind the driver's seat to the top of the tailgate." — New Jersey funeral director.

Perhaps Plymouth engineers would rather accommodate their live customers!

"My taxi customers complain about low headroom." — Vermont taxi owner.

They gripe about Plymouth's competitors too. Its headroom is about average.

"I'd like a couple more inches of back-seat room because I keep the front one entirely back." — Pennsylvania music teacher.

Here we go again—back to the behemoths—inch by inch!

"Rubber around the ventilator windows isn't wide enough. The wind whistles around the glass all the time." — New York nurse.

"Weather stripping on windows doesn't fit too good, especially on the vent windows." — Illinois carpenter.

This seems to be one of the big quality-control problems for the first few months of production on a new body design. The only real answer seems to be—stabilize your design.

"A front side window doesn't fit properly and lets lots of air in when you're driving." — Texas teacher.

"The doors make too harsh a sound when closing." — Illinois salesman.

"Sharp point on the front door comes close to your eyes when you open it." — North Carolina architect.

"The doors still don't fit right—air comes in on both sides." — New Mexico government worker.

"I had to have door locks replaced." — Illinois TV serviceman.

"Water leaks in around the doors." — Michigan auto mechanic.

Some day we may see precision-molded plastic door seals that will fill all uneven gaps.

Here are additional best-liked features, ranking seven through twelve in their order of mention.

"It is small enough to park almost any place in the city without any trouble." — Montana logger.

"It has achieved a good compromise between inside seating space (3-seat wagon) and outside bulk and size." — Michigan librarian.

(Continued to page 248)

NEW FROM ALADDIN



B-I-Y

ALADDIN'S NEW B-I-Y SYSTEM

combines the basic principles of the Redi-Cut Home with the most advantageous techniques of Custom-Built, Component, and Pre-Assembled construction methods.



This beautiful Aladdin Home is just one of 112 different styles and designs available from Aladdin. Prices range from \$3,000 to \$10,000, freight prepaid.

ALADDIN . . . the world's oldest and largest manufacturer of Redi-Cut Homes, now presents the most advanced concept in individual home construction yet developed . . . **ALADDIN'S NEW B-I-Y SYSTEM.** The B-I-Y System is another result of Aladdin's continuing creative research efforts . . . efforts dedicated to finding new ways of supplying "better homes for less money."

B-I-Y combines the basic principles of Aladdin's famed **REDI-CUT HOME** with the most practical aspects of Custom-Built, Component, and Pre-Assembled construction methods. This combination of the best qualities of four different methods into one *simplified system* has produced a home-building concept far superior to any yet developed for the individual home builder.

MAIL COUPON

for further information. You will receive the big new 1962 Aladdin "Book of Homes" . . . 72 pages filled with valuable home-building suggestions.



Aladdin B-I-Y was developed so *you can have a quality home for less* whether built by yourself or erected by others. It has been *field tested and publicly accepted.*

SAVE TIME!

Outside walls and inside partitions erected, and outside walls sheathed, in 50% less time;

Inside rough door openings completed (frame, trim, door, and hardware applied) in 30 minutes.

SAVE MONEY!

These, and many other savings, are yours with our new *place and nail* system.

QUALITY MATERIAL THROUGHOUT

Build the Aladdin B-I-Y way—save up to \$5,000.

THE ALADDIN COMPANY
BAY CITY, MICHIGAN

62-20

☐ Please send 1962 "BOOK OF HOMES" with complete information about the new Aladdin B-I-Y Home-Building System. Enclosed is 25¢.

NAME _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____

(Please Print Carefully)

**Bore 35 standard holes
with just one tool**

New IRWIN Expansive Bit

lets you dial your size

Just turn the dial and you're set to go with this new Irwin Expansive bit. No hunting for the size you need. Fits all hand bit braces. Clean, fast, accurate boring action from $\frac{1}{8}$ " to 3"—35 standard hole sizes in all!

And what a really fine precision tool to own. It's drop-forged from special bit steel, heat treated full length, machined for accuracy and sharpness, highly polished, too. Two cutters supplied with each bit. Model No. 21 with $\frac{5}{8}$ " to $1\frac{3}{4}$ " boring range also available. Ideal for home handyman, professional woodworker, or farm. See your independent hardware dealer soon.



**No. 22
Micro
Dial
only
\$4.00**
 $\frac{1}{8}$ " to 3"
boring
range

IRWIN

Wilmington, Ohio

the original solid
center auger bit

screw drivers
screw driver bits

P & C

CLIK-STOP

Adjustable
Wrench

**AUTOMATICALLY
LOCKS AT
EVERY SETTING**



No levers . . . no gadgets . . . it won't slip or work loose . . . ever! You can yank it, bang it, even on the toughest jobs the jaws will never work loose. Available in both chrome or industrial-black finish in sizes from 4" to 20".

Send 10c for descriptive P&C Tool Catalog.

Look for the colorful
P&C Merchandisers
in over 12,000 stores.

P & C TOOL COMPANY

Portland 22, Oregon • subsidiary of Pendleton Tool Industries, Inc.

"It is large enough on the inside and by cutting off some of the length it is easy to park and fits in my garage."—District of Columbia government engineer.

"This is a full-size car trimmed down some—less weight."—Pennsylvania investment manager.

Its size should suit most logical motorists, yet 5.3 percent complain of lack of head or legroom.

"Holds the road on old pavements like a heavy car."—Missouri insurance agent.

"I like the cornering and roadability—best handling car I've ever owned."—New Mexico airman.

"Handles well; fine balance; no sway on curves or at high speeds (60-65 m.p.h.)."—Michigan city assessor.

PM's Plymouth Six was stable at 85 m.p.h. traveling on uneven black top.

"It holds the road better than any light car I have ever driven."—Tennessee farmer.

"I like the self-adjusting brakes and their straight, swift, sure stopping power."—New York toxicologist.

Brakes are new on '62 Plymouth—a different design—but one that's had plenty of testing time on other cars.

"Quick, smooth stopping."—Oklahoma teacher.

"Quality is excellent; fit of the chrome is good—no mismatch. Tight, no body rattles."—Michigan engineer.

"The improved fit of the trim is what I like. Things actually fit together for a change!"—Iowa timekeeper.

Like many other loyal Plymouth owners he's noticed that something new has been added—quality.

"Six-cylinder motor is silent."—Ohio retiree.

"I like the comfortable seats; you sit up straight as in a chair."—Michigan photo-engraver.

"There's an improvement in seating comfort in the rear seat as well as the front."—New York foreman.

Seats are comfortable but the degree of improvement depends on what you were driving before.

Getting back to the gripes, here are representative complaints on items six through nine in order or frequency.

"You must lift things too high to place them in the trunk."—Pennsylvania plant guard.

"Don't like the construction of the luggage compartment which requires lifting any object placed in it as high as the top of the car."—Illinois office manager.

If you don't have this high "transom" area say the engineers, you must have double (inner) trunk walls, hence less space inside.

(Continued to page 250)

SURPLUS SALE

GOVT. SURPLUS
EXCESS INVENTORY
BANKRUPT STOCK



GOV'T SURPLUS A-C POWER PLANTS

• Wonderful buys in fine Govt. plants and generators. Save 40% to 70%.

• 1000-w 115-v 60-c	\$172.50
• 2500-w 115-v 60-c	269.50
• 3500-w 115/230-v	329.50
• 5000-w 115/230-v	479.50
• 3000-w AC generator	139.50

HYDRAULIC SURPLUS BARGAINS

• Great savings. Build loaders, diggers, presses, etc. Brand new equipment.

• \$85 Pump, 1000 lb., 14 gpm.	\$41.60
• 12-v Battery Hyd. Pump	18.49
• Hand Hyd. Pump and Cylinder	27.95
• \$39 Hyd. Cyl. 3x8" 2-way	19.70
• Hyd. 2-way 1000-lb. Valve	18.00



AIR COMPRESSOR EQUIPMENT

• Make your own outfit. For painting, tires, shop use, etc. Save to 60%.

• Compressor, \$21.50. Gov't Tank, \$10.95. Gauge, \$1.75. Paint Gun, \$11.50. Auto Switch \$4.75. Air Regulator \$3.95.
--

DIAL TELEPHONE

• Item #716. Std. phone, same used on all phone systems. Use as extension to main phone and on private systems. Directions furnished. Wt. 8 lbs. Cost \$25.00. SALE... **\$7.95**



STORAGE BATTERY WINCHES-HOISTS



• Item #311. Expensive 12-v Gov't. reversible, ball bearing 2000-lb. capacity winch. Holds 40' 1/4" cable. For trucks, docks, boats, etc. Cost over \$250. SALE... **\$49.95**

Many other types battery winches-hoists.

FARMERS-CONTRACTORS PUMPS-PIPE

• Item #204. Self priming Timken bearings, 1 1/2" size, use for irrigation, swimming pools, boats, cellar drains, etc. Wt. 32 lbs. Gov't. cost, \$80.50. SALE... **\$19.49**



SPECIAL OF THE MONTH!

U. S. ARMY FIELD TELEPHONES

• Item #756. Limited quantity of these efficient compact phones, wonderful for contractors, farmers, Boy Scouts, foresters, builders, etc.



• Complete units, require only single pair wire between stations. Has own signal generator, bell, etc. Talk over any distance up to 20 mi. Gov't. cost over \$30. SALE Two for \$24.95... **\$13.97** each.

EXAMPLE BARGAINS 1962 CATALOG

• \$12 Fish & Worm Shocking Generator...	\$3.49
• \$155 Telephone Audio Amplifier ...	14.91
• 30c G-Pr. Buried-Aerial Cable ...	5c ft.
• \$30 Linemen's Belt & Safety Strap	10.29
• \$35 Motor Driven Sweep Floodlight	7.95
• \$40 Fire-Burglar Alarm System ...	12.95
• \$29 0-120 AC Motor & Transformer	8.39
• \$17 Immersion Heater 800-w 115-v	3.31
• \$250 Welding Generator 200 amp...	14.95

ALL FOB LINCOLN

Write today for large 1962 catalog.

SURPLUS CENTER

DEPT. 804, LINCOLN, NEBR.

INCREASE HOME VALUE—MAKE NEEDED IMPROVEMENTS NOW

\$25.95

POSTPAID

NEW 1/4 H.P. bench grinder



MONEY-BACK GUARANTEE—

You save over 40% on this top-quality, 1/4 hp bench grinder. If not satisfied, return prepaid in 10 days for full refund. Full 90-day warranty. Underwriters' listing... Send check or money order; no C.O.D.'s, please.

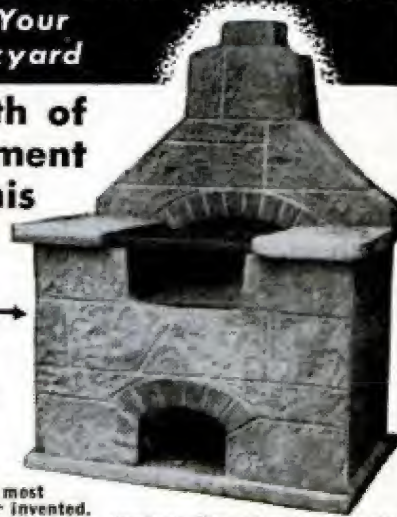
ORDER BY MAIL
SAVE OVER 40%

HUNTER DIVISION, ROBBINS & MYERS, INC.,
P. O. BOX 3775-B, MEMPHIS, TENN.

MANUFACTURE THIS BEAUTIFUL CONCRETE OUTDOOR FIREPLACE

Right In Your Own Backyard

\$4.00 Worth of Sand & Cement produces this Attractive Fireplace.



Sells on Sight from \$60. to \$80. Easy to start your own Profitable Business.

The General Fireplace Molds and Process are the most amazing and foolproof ever invented. Simple to operate. Two men can produce five fireplaces a day.

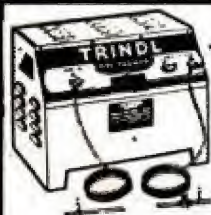
BIG DEMAND!!

Sell all you produce to Department Stores, Homeowners, Parks, Nurseries and Picnic Groves. Fireplaces sell on sight. No experience necessary. We supply full operating instructions and equipment plus the know-how that spells **BIG PROFITS**. This is an outstanding opportunity for men of vision and small capital to get into a busy rich paying field. Don't delay, be the only exclusive manufacturer in your own home town. Mail coupon at once for full details as to how you can reserve your territory. Molds sold only on exclusive franchise.

GENERAL ENGINES CO., Inc., Dept. MF-22
ROUTE 130, THOROFARE, N. J.

Mr. Tor of Philadelphia writes: Sold 250 in first 4 months. Selling to Sears Roebuck, John Wanamaker, and Gimbel Bros. in Philadelphia area.

Name _____
Address _____
City _____ Zone _____
State _____



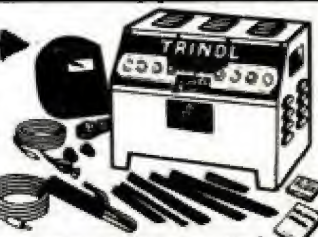
PIPE THAWER

THERM-O-TRON PIPE THAWER, the original, tried & tested way to safely, easily, electronically thaw frozen pipes. All voltages. Portable complete with cables - clamps, instr. Just \$98.50. Also **BRAZE - SOLDER - SWEAT COPPER PIPES**. Indispensable for farmers - plumbers - homes - industry - etc.

TRINDL

ARC WELDER

Do your own metal work... **WELD - BRAZE - SOLDER - CUT** Thrifty & expertly. World-Famous 125A TRINDL WELDER, 110/220 V marvel gives 16 heats, 20-125 amps. Handles 1/16" - 5/32" rods & 1/2" metal. Only \$98.50 complete. TRINDL mfg'rs. range of heavier models.



GUARANTEED full year for CONTINUOUS OPERATION. WRITE for details, also time payment plan. Dealer inquiries invited.

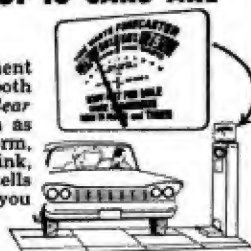
TRINDL PRODUCTS, LTD. Dept. T2-B 1807 South Clark Street Chicago 16, Illinois

this message to
AUTO MECHANICS contains
FACTS EVERY CAR OWNER
OUGHT TO KNOW ABOUT
THE BEAR®

LINE-UP OF PROGRESS

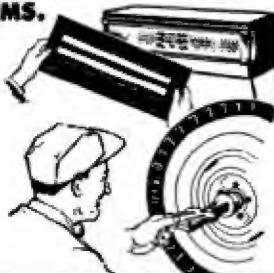
FACT 1. 7 OUT OF 10 CARS ARE OUT OF ALINEMENT!

50% Tire Waste due to misalignment is common. Quickest test for both front and rear wheels: *The Bear Drive-Over Scuff Check*. As soon as your wheels pass over the platform, your car is checked. Quick-as-a-wink, the *New Tire Waste Forecaster*, tells you exactly how much tire life you are wasting!



FACT 2. CAR FACTORY APPROVED SETTINGS ASSURED WITH CHECK-O-MATIC AND TELAMATIC SYSTEMS.

Now, both the mechanic and the car owner can see AT-A-GLANCE whether wheel alignment meets car factory specifications both BEFORE AND AFTER CORRECTION! Special templates for each model car assures perfect settings of caster and camber!



FACT 3. MISALIGNMENT WEARS OUT TIRES AND PARTS; CAUSES UNSAFE, FATIGUING STEERING!

Wheel shimmy, hard, see-saw steering, road wander, accidents! All these are the results of misalignment. So easily and accurately is it detected and corrected with Bear Equipment that costs for this service are most reasonable.



FACT 4. BEAR LEADERSHIP IN PRECISION EQUIPMENT, BEAR SCHOOLS, BEAR SIGN OF PROGRESS.

In Bear's Line-Up of Progress are the newest developments in shop equipment for wheel alignment, balancing, body repair, brake, headlight and steering service. Superior adjustments are assured through use of this equipment by BEAR SCHOOL TRAINED MECHANICS. Look for the BEAR SIGN, the sign car owners look to with confidence. No wonder more shops display the BEAR SIGN and use Bear Equipment than all others combined!



PASTE ON A POSTCARD AND MAIL WITH YOUR NAME & ADDRESS TO:

BEAR MFG. CO., Dept. P-10, Rock Island, Illinois

I'm interested in ☐ CAR OWNER FACTS BOOKLET
☐ BEAR SCHOOL ☐ BEAR SERVICE AS A BUSINESS OPPORTUNITY

"I am disappointed in the gasoline mileage (12 m.p.g. with V8, automatic transmission), however, I am assured by the dealer that it can be improved."—Iowa banker.

"I'm getting poor gas mileage. My '59 V8, same motor but a four-door, averaged 20 m.p.g. on the road and 18 in the city."—Arizona army officer.

"Padding on the instrument panel has a glossy finish that reflects on the windshield as you drive into the sun and tremendously impairs visibility."—Colorado clerk.

"Dash glare in the windshield on sunny days is very bad."—Montana physician.

"I cannot see any part of the rear of the car when backing up, but I'm getting used to it."—Colorado petroleum worker.

This is a real problem for short-waisted people who sit low in their cars. You can't see the rear "corners" of the car.

"I am unable to see the right front corner and the rear from the driver's seat."—Arizona auditor.

"With the windshield and rear window smaller, vision is not as good as previously."—New York minister.

And here are the final favorable comments in order of mention, numbers thirteen through eighteen.

"I like being able to see the road over the engine while driving."—Colorado retiree.

"I like the easy-to-view instrument panel and the compact control center."—Alabama electrical engineer.

If prizes were given out for new instrument panel designs of '62, Plymouth would have itself a blue ribbon.

"Plenty of room for the three six-footers in our family."—Michigan salesman.

"High back on second wagon seat makes a 'playpen' in the rear area."—Colorado housewife.

"The new second gear is what I like. It gives a faster getaway."—Maryland plant guard.

For a final short list of complaints, here are items ten through twelve as they occur in frequency.

"I'd like to have the windshield a few inches farther forward."—North Dakota advertising salesman.

"Too much wind noise through vent window."—Missouri clerk.

This seems to be result of an accumulation of "off" tolerances in door structure, window frames and sealing rubber that all add up in the wrong direction.

"The location of the spare tire takes up too much room."—Florida expediter.

"The spare tire is in a very poor place, right in your way."—Indiana tool and die maker.

★★★

CUT-TO-FIT HOMES CUT COSTS UP TO 40%

Save labor cost up to 100%, reducing completed home cost up to 40%. You can assemble any of 57 designs from easy-to-follow plans. No measuring or cutting . . . every piece precision machine pre-cut and marked. **BUY DIRECT FROM MILL.** Eliminate all between overhead, profit and labor

PRICED FROM
\$2295 UP

FIVE EASY-PAYMENT PLANS

CHOICE
OF
57
DESIGNS



INTERNATIONAL MILL & TIMBER CO. Bay City, Michigan, DEPT. PM22

Mobile Snow Melter

Melting snow at the rate of about 300 gallons a minute, a mobile unit can, in one hour, rid a city's streets of an amount equal to 40 truck loads.

The snow melter, developed by Esso Research and Engineering Co. of Linden, N.J., consists of a melter mounted on a trailer drawn by a truck tractor. A tank containing highly agitated water heated to about 45 degrees receives the snow dumped in by front-end loaders. Using the principle of submerged combustion, the device melts the snow almost instantaneously and the water drains into the sewer system.

Oil Is Alaska's Top Resource

No oil was produced in Alaska until three years ago, but production for 1961 was an estimated six million barrels. It may have succeeded gold as the state's largest mineral resource.

The first oil discovery was made on the Kenai Peninsula in July, 1957, and all production has taken place in that area. One company plans to build a \$20,000,000 refinery there.

Wildcat activity is spreading, however, and 13 companies have geologists working at the northern edge of the continent.

The 'All-Purpose' Oil For Home Workshops

Cleans • Lubricates • Prevents Rust

3-IN-ONE® OIL

REGULAR—OIL SPRAY—ELECTRIC MOTOR



PORTA-THAW
TH-3-10

Thaw pipe without digging or creating fire hazards. Just plug this low cost PORTA-THAW into a regular 110/220v AC power line. It's completely safe. Has no connection between power line and output terminals. Provides low, medium, high currents. Clears lines in 5 to 20 minutes. Complete with power cable, plug, receptacles, two thawing cables. Ask for data sheet TH-3-10.

HOBART BROTHERS COMPANY, BOX M-22, TROY, OHIO, PH. FE: 2-1223

costs. Nothing to plan or figure. Complete with all lumber, hardware, paint, nails, glass, roofing, etc. Sterling Home quality material throughout. Freight paid most areas. Write today. Send 25c for illustrated, color catalog, floor plans and details.

EVERLITE* World's THRIFTIEST Light Plants

(Item
869-15T)



1500 watt amazing new alternator. Most efficient trouble-free light plant ever made. Rugged new transistor circuit eliminates commutator and armature—all the old headaches of generators gone. Output is standard current—115v., AC—operate oil burner, freezer, lights, TV, power tools or anything that requires up to 1500 watts. Powered by sturdy fast starting 3 hp Briggs engine guar. for 1 full year. Price is unbelievable, only \$209.50 F.O.B. factory for the finest 1500 w. plant made.

*Trade-Mark Registered
Everlite 1500 watt, Item 869-15T Wt. 60 lbs. . . . \$209.50

STANDARD DIAL PHONES WITH BELL

Western Electric dial phones same as used by all telephone companies. Easily installed as extension phones. Also ideal for private phone system. (Please specify). Merely dial to ring other party—Local and clear even at long distances. Needs cond. wire for private line.
Item 855, Wt. 8 lbs., each phone. . . . \$8.95
Wire—4 cond. 22 gage, 250 ft. coil. . . . \$4.95
Wire—4 cond. 19 gage (for distances over 500 ft.) 250 ft. coil. . . . \$7.95



Fast delivery—10 day money back guarantee. All prices f.o.b.

MASTER MECHANIC MFG. CO., Dept. A-262, Burlington, Wis.
Southern Customers Order from Dept. A262, Box 65, Sarasota, Florida

\$47,983.06 ORDERS FROM 12 WORD CLASSIFIED AD.

Amazing—Startling—but TRUE. Terrific story sent free. Request must be made on business letterhead. F. W. Johnson, Classified Adv. Manager, 200 E. Ontario St., Chicago 11, Ill.

HANDIEST SAW YOU EVER HELD! Cuts Wood -- Metal -- Plastic -- up to 4 1/4" thickness with Finger-Tip Control



Just \$14.75 including 6 assorted

F.O.B. Los Gatos (postage prepaid if cash with or blades, lubricant and wrench (der). Wt. 2 1/2 lbs.

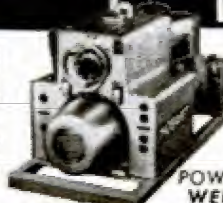
GRIP-TORC Saw gives YOU control of the blade because of its right angle pivoting on electric drill. Compact 6 1/4" length gets at hard-to-reach places . . . cuts squares, circles, bevels, and close to wall or floor. Reversible blade for right or left hand use, with push or pull movement. Provides unexcelled cutting speeds. Unconditionally guaranteed. Order today!



tools 17480 SHELburne WAY
LOS GATOS, CALIFORNIA

THAW FROZEN WATER PIPES FAST.

DC WELD • RUN AC TOOLS



New low cost welder/power combination furnishes DC current for welding and 110/220 v. AC power. Runs lights, tools, motors, pumps, sprays, etc. Can be invaluable as an emergency power source for brooders, milking machines, furnaces, etc. Ask for data sheet A-279-J.

	
Has the face of our house changed!	We used to have this old basement door.
	
Till we heard about all-steel Bilco.	And replaced our old door.

Spring balanced Bilco Doors open at a touch... lock securely... are weathertight, cost so little! The door used on thousands of new homes!

The Bilco Co., Dept. RJ2
New Haven 5, Conn.
Please send me your fully illustrated folder and name of local dealer.

Name _____
Address _____
City _____
Zone _____ State _____

Bilco
AMERICA'S FINEST BASEMENT DOOR

 **YOU** NEED THIS

FREE GIANT B-A CATALOG



BURSTEIN-APPLEBEE CO.
Dept. PM, 1012 McGee St., Kansas City 6, Mo.
☐ Rush me New 1962 B-A Catalog No. 621

Name _____
Address _____
City _____ State _____

SEND FOR IT TODAY

SAVE UP TO 50% ON B-A SELECTED KITS
HI-FI AND STEREO SYSTEMS & COMPONENTS
TOP VALUES IN POWER AND HAND TOOLS
30 PAGES OF BARGAINS NOT IN ANY OTHER CATALOG



Robot Bank Teller

Customers may insert blank deposit slips in an automatic machine that accepts coins, currency and checks — and receive validated deposit slips in return.

The machine is expected to speed up rush-hour service in bank buildings. In addition, banking service can be extended beyond the building by placing machines in shopping centers and remote locations.

Employing electronic and electromechanical techniques, the Bankograph makes a microfilm record of the deposits to insure accuracy and packages each deposit separately. It is made by Reflectone Electronics of Stamford, Conn.

The Clown Who Winks

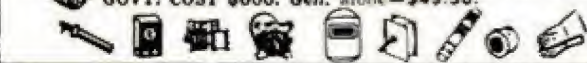
his eyes in tempo with the music. Watch for this clever radio receiver project in the upcoming March issue of

POPULAR MECHANICS

WAR SURPLUS AND OTHER BARGAINS SAVE UP TO 90%

DC JET GENERATOR ARC WELDING KIT Complete with GE Type CM-77 Generator (30 volts D.C., 400 Amp., 3000 RPM up; ampere rating is for continuous duty, intermittent amperage is 500 to 600 amps.), also 2 rheostats, 1 voltage reg., 1 voltmeter, 1 electrode holder, 1 welder's mask, 1 toggle switch, 10 lb. vacuum packed 1/4 in. welding rods, pair welder's gloves & spline coupling. All units guaranteed pre-tested. Wt. 110 lbs. Approx. GOVT. COST \$700. All items, now only **\$64.50**.

*G.E. Generator noted above can be purchased separately. Makes deluxe heavy-duty welder comparable to the finest commercial welders available. Wt. 90 lbs. Approx. GOVT. COST \$600. Gen. alone—**\$49.50**.

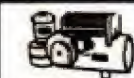


ELECTRIC STORAGE BATTERY WINCH New, improved model contains heavy-duty, 2-way drum switch. Fully reversible heavy-duty, two-speed motor, 160 to 1 gear reduction. Ball bearing construction throughout. Drum will handle 70' of 1/4" cable. Can be used on 6, 12, 24 V. battery. Lift cap. 2000 lbs. plus. Ready to install & operate. 19" long x 9" wide x 8" high. For jeeps, trailers, boats, trucks, etc. Complete with mounting flange safety load locking brake. Shpg. Wt. 60 lbs. Approx. GOVT. COST \$400. NEW. Model E—**\$49.50**.

"SUPER 9" 200 AMP WELDING KIT With Deluxe accessories consisting of one 200 AMP. Gen., adjustable helmet, electrode holder, ammeter and shunt, rheostat, toggle switch, voltmeter, voltage reg., 1 pr. heavy-duty welder's gloves and 30' cable. All units guaranteed pre-tested. Approx. GOVT. COST \$500. Most items new—all perfect, **\$27.50**.



SOUTH WIND HEATER & ACCESSORIES Manufactured for govt. antarctic expeditions for jeeps and half-tracks. Heating unit puts out over 20,000 B.T.U.'s. Late recirculating type. Burns any type gas. 12 volt system. Fuel consumption extremely low, 1 gal. per 8 hrs. Terrific for trucks, etc. With service & installation manuals & many components. Approx. GOVT. COST \$550. Shpg. wt. 50 lbs. NEW. **\$39.95**. Limited quantity.



R1 GENERATOR—300 AMP. Make your own arc welding and battery charging unit. Terrific source of power for all 24-32 V. equipment. Simple installation with our wiring diagram. All generators pre-tested in our own shop. Approx. GOVT. COST \$400. Like NEW. **\$16.50**.

ELECTRIC PUMP WITH CONTROL UNIT Runs on 12 or 24 V. Centrifugal type. Draws 5.2 AMPS. Has built-in removable filtering screen. Great for bilge, circulating or sump pump... bait tanks, etc. Pumps 400 GPH. Complete with on and off switch rheostat. Shpg. Wt. 7 lbs. Approx. GOVT. COST \$195. NEW **\$8.95**.



DELUXE ELECTRIC STORAGE BATTERY WINCH Handles 250' of 1/4" steel cable. Operates on 6, 12, 24 V. battery. 160-1 gear reduction. Lift cap. 2500 lbs. Contains heavy-duty mounting base with outrigger bearing and spool support. Rugged construction. Heavy-duty dual speed motor with safety load-locking brake. Dim. 24" long x 9" wide x 8" high. Great for jeeps, trailers, boats, trucks & campers. Shpg. Wt. 80 lbs. Approx. GOVT. COST \$490. NEW. Model E-D—**\$69.50**.



FRESH WATER SYSTEM PUMP—For boats, campers & trailers. Output 10 to 200 gal. an hr. Variable rheostat controls output. 1 1/2" pipe thread into bronze impeller housing. 12 V.D.C. Radio noise filter. 5.2 amp. draw. Explosion-proof const. Shpg. wt. 11 lbs. Complete with mounting instructions & wiring diagram. Approx. GOVT. COST, \$200. NEW. **\$10.95**.

225-1 REDUCTION GEAR For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor and clutch. Easily reversible wiring diagram furnished. Hi torque, 105 RPM. Runs on 6-12 or 24-32 V. 65 lbs. gross. Approx. GOVT. COST \$300. **\$13.50**. Matched spined gear—**\$3.00 ea.**



NEW 1962 CATALOG! Tremendous catalog—our biggest ever—fully illustrated—1000s of bargains in war surplus & other items. Send 25c in coin for your copy today or free copy with order. Where ppd. indicated applies to US only. Other prices FOB Culver City, Calif. Send cash, check, money order, 50% deposit for COD.



AIRBORNE SALES CO., INC. DEPT. PM262
8501 Stellar Drive, Culver City, Calif.

WHERE-TO-FIND-IT LIST

WHERE-TO-FIND-IT List for this issue, free on request, gives sources of supply or further information on all editorial items for which this information is available. Send a stamped, self-addressed envelope to



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200 E. Ontario Chicago 11, Illinois

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ROLLS • FORMS • BENDS



Make screen door guards, wall hangings, plant shelves, room dividers... anything you want in light wrought metal and with a truly professional appearance. Form rod, tubing or flat metal.

\$34.95 PREPAID including material



Write for information and free project folder.
SWAYNE, ROBINSON & CO.
Dept., A, 228 E. MAIN ST., RICHMOND, IND.

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SAFE!
No chain to grab or whip

10,000 cutting strokes per minute

WRIGHT® POWER BLADE SAW

The most useful gasoline-powered saw you can own. Rugged power for felling 20" trees, smooth cut for carpentry or pruning, perfect for firewood. Safe to use, even on a ladder. Send coupon today for free plans, literature and the name of your nearest dealer.



FREE PLANS

Plans for log cabin also shows how to build duck blind, rustic furniture, boat dock, fences, etc.

HOW TO BUILD A LOG CABIN



THOMAS INDUSTRIES INC., Wright Saw Div.
Dept. PM-2, 207 E. Broadway, Louisville 2, Ky.

Name _____

Address _____

City _____ Zone _____ State _____



What's New in High Fidelity

by Fred Honig
Former Editor of Hi Fi Guide, well-known
writer and authority on high fidelity

Music Throughout Your Home

You'll work better in your shop—have more fun in your playroom or greenhouse, out on your patio, relax more at bedtime—with the right kind of music throughout your home. From a central control point—perhaps located in your living room—a compact stereo/high fidelity music system will bring you the true realism and depth of the music you want to hear, where and when you want it. This arrangement is also ideal for the kids' playroom, since it keeps them out of the living room, yet lets them enjoy the music they want—superbly reproduced. Besides great flexibility, components offer economy, too, because the need for several installations is eliminated.



DYNACO's
FM-1 Dynatuner
Kit, \$79.95
Semi-kit, \$99.95
Pre-assembled,
\$119.95

For example, FM tuners (stereo or monaural) built specially for component systems, incorporate the latest electronic advances, and can act as the source for radio signals heard throughout your entire home. Teamed with other components of your music system, a tuner such as shown will provide radio listening of a quality obtainable only through components.

Records are a wonderful source of high fidelity music, and one record player can serve the entire home. The sound of your records depends upon the engineering of the record player which must track sensitive cartridges for a wide range performance without undesirable effect. This demands precision turntables, motors and tone arms. Some units (as shown) are automatic.



GARRARD
Type A
Automatic Turntable
(Dynamically Balanced
Tone Arm)
\$79.50



ALTEC-LANSING
Model 505A
"Duplex" Speaker
\$177.50

Whatever the sound source, what you ultimately hear is the speaker. Full range speaker units, such as that shown, can reproduce the full spectrum of sound undistorted. Yet they offer great versatility, since they can be incorporated into any room or area, either built-in or within suitable enclosures which you can buy complete or build yourself, according to your abilities and interests.

Through components such as these, a single stereo system with FM tuner, record player, tape recorder, amplifier and speakers as required for your needs can easily provide music for your entire home. Mail the coupon below for a free booklet.

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Institute of High Fidelity Manufacturers, Inc.
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Start Your Vacation Home

(Continued from page 94)

the floor sections will eventually rest on the foundation of the basic unit. Supported by two beams which are built up of 2 x 8s to rest on concrete-block piers and pilasters, the floor sections are toenailed to a 2 x 8 plate atop the foundation wall. The plate is anchored here and there with bolts mortared in the cores of the top course of blocks. In addition to being toenailed to the plate, the floor sections are nailed to each other from under the crawl space, as well as being nailed along the lapped joints. Next month you'll see how the side walls are prefabricated and how the roof is framed.

Go-Anywhere Boat. For the first time, you can build a boat designed for water jet propulsion, and enjoy piloting it through those snag-filled water inlets that are too shallow for prop operation. Watch for the plans in the March Popular Mechanics.

Ink Isn't What It Used to Be

Before letters, diaries and other original papers of historical significance can be sealed permanently in plastic, the paper must be treated chemically to halt deterioration. This works fine for early documents, but the ink floats right off 20th-century papers. Today's inks are water soluble; old ones were not.

Washington State University is studying the problem, investigating various misting and atomizing processes. The school's library is custodian of more than a half million documents pertaining to the history of the Pacific Northwest, and most of the papers are less than 70 years old.

Jupiter's Spot Is Stuck

The red spot on planet Jupiter does not float. It is the top of a fluid column of poisonous atmosphere confined above a surface peak by whirling winds, says British astronomer Dr. Raymond Hide.

First seen in 1878, the spot now appears brown. It is estimated to be 25,000 miles long and 8000 miles wide.

Dr. Hide discounts the long-held theory that the spot floats because it remains in the same latitude, even though it rotates at a different rate than does the planet.

The rotation difference is caused by Jupiter's atmosphere, he says, which is so thick it can move solid parts of the planet, and thus change the rotation rate of that part.

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PUZZLE: FIND AL

Al's got himself lost in his job.

He does his work. He draws his pay. He gripes, and hopes, and waits. But the big breaks never seem to come.

You have to hunt hard for Al. He's in a rut!

Then, who's the figure standing out in the picture? That's Tom. Tom grew tired of waiting. He decided to act. He took three important steps:

1. Wrote to I.C.S. for their three famous career books.
2. Enrolled for an I.C.S. job-related course.
3. Started to apply—on the spot—what he was learning.

The others began to say, "Ask Tom, he knows." The supervisor began to take notice. The boss began to receive reports on Tom's progress. *And Tom began to move!*

It's a fact worth remembering: An I.C.S. student always stands out!

P.S.—You'll find men like Al everywhere—griping, hoping, waiting—reading this and skipping on. But forward-looking fellows like Tom will take time to investigate, will mark and mail the coupon and get the three valuable career books free. They're men of action. And a few short months from now, you'll see them start to move!



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- ☐ Architecture
- ☐ Arch. Drawing and Designing
- ☐ Building Contractor
- ☐ Building Estimator
- ☐ Carpenter Builder
- ☐ Carpentry and Millwork
- ☐ Heating
- ☐ Painting Contractor
- ☐ Plumbing
- ☐ Reading Arch. Blueprints

ART

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- ☐ Magazine Illus.
- ☐ Sign Painting and Design'g
- ☐ Sketching and Painting

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- ☐ Auto Engine Tuneup
- ☐ Auto Electrical Technician
- ☐ Diesel Engines

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- ☐ Aviation Engine Mech.
- ☐ Reading Aircraft Blueprints

BUSINESS

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- ☐ Advertising
- ☐ Bookkeeping and Cost Accounting
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- ☐ Business Management
- ☐ Clerk Typist
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- ☐ Construction Engineering
- ☐ Highway Engineering
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- ☐ Structural Engineering
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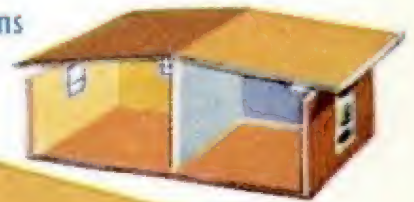
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